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AVIATION

The Oldest American Aeronautical Magazine

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AVIATION

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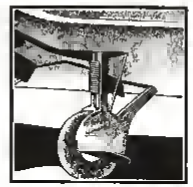

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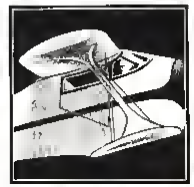

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BEECHCRAFT

Closely associated with all of the D. of C. light plane projects, and having just flown Waterman's Arrowplane from Los Angeles to Washington, the author is eminently qualified to discuss the behavior of the unconventional airplane in unconventional situations.

Transcontinental Test Hop

By John H. Geisse

Chief, Development Section, Bureau of Air Commerce

Official interest. Secretary of Commerce Roper and Assistant Secretary Johnson look into Waldo Waterman's Arrowplane which John H Geisse (right) has just landed at Washington's airport after a flight from Los Angeles.

AUTHOR

At the time I was asked to write this article on the small plane development of the Department of Commerce, I had had only one brief flight in the Hammond Y, an equally brief flight in the Waterman Arrowplane, and had not flown the Weick at all. Since then I have put in quite a few hours on the Waterman, both on the West Coast and in bringing the machine from Los Angeles to Washington, a flight which was completed on Aug. 12. Altogether then, my experience with the several new types has been somewhat limited and these remarks, therefore, must be considered as somewhat preliminary and subject to change without notice.

In my work with the Hammond I was impressed first of all with the feeling that I was able to judge the flight path of the plane more accurately than I can ordinarily estimate it in first flights with the more conventional tractor types. It was an agreeable surprise to find that I could, without difficulty, judge the attitude of the airplane at all times, although the test pilot who had been flying the ship apparently had strung a wire across the side win-

dow to assist him The fact that I was able to recognize the actual flight course of the machine accounts largely for the fact that I felt at ease in it, even with very little experience In coming into the field over some trees for example I am sure that I cleared them with considerably less margin than I would ordinarily do with a tractor, and I know that I worried much less than usual about it As a matter of fact, my landing was completed and the plane was on the ground almost before I realized it.

That was my first flight in a pusher, also my first with a machine on a three-wheeled landing gear I was completely sold on both ideas and have yet to be unsold

When I first started work with the Waterman machine, I found that I did not have quite the same feeling about my ability to sense the flight path properly and accurately This can be accounted for, possibly from the difference in windshield arrangement, possibly due to my own nervousness in flying a plane of such an experimental type for the first time I rapidly became accustomed to it however, and soon recovered my enthusiasm for the visibility afforded by the pusher type and for the wide range of landing attitude permitted by the three-wheeled undercarriage

First cross-country

My transcontinental trip did nothing to change my mind about either of these features I landed on one strange field after another, and also made my first night landing in any airplane. If such experiences had not convinced me, there were a number of incidents on the trip which would certainly have done so

For example, at Lordsburg, N M, with the field somewhat soft and some 4,200 ft above sea level I had difficulty in taking off Of course I know that the ship should have been able to get away readily (and if it ever sees that field again I am sure it will) but being yet in the experimental stage, and possibly somewhat tired after its long trip from Los Angeles, it apparently had no desire to leave that city which, to say the least gives all visitors a warm reception, both figuratively and actually With the conventional landing gear I certainly would have been nervous With the three wheeled gear however I had no hesitation in opening the throttle wide and using all of the field in attempting to get off We just couldn't make it and at each failure a hard application of the brakes prevented catastrophe Finally, a combination of a slight wash at the end of the field and a somewhat too-sudden application of the brakes was too much for the landing gear One wheel pulled loose Except for slight damage to the undercarriage there was no other harm to the ship and none whatever to me—not even a shock

After doing things to the landing gear (which later proved not quite enough) I tried it again, but with the same result It seemed entirely hopeless to get off, until I remembered something about that landing gear; then it was easy I simply used two sides of the field, making a turn during the take-off run. That worked beautifully It solved the problem as far as take-off was concerned

An unorthodox landing

Once I got into the air I found that the repair job that we had done had not been as good as it might have been The wheel that had been fixed stayed up while the other dropped down to the usual 12 inches, the full stroke of the oleo I tried my best to shake it down in the air, but it couldn't be budged In a conventional ship with a radio set there would have been only one thing to do—radio ahead to have preparations made for a crash landing Having no radio I couldn't communicate with the ground, and by that time I wouldn't have done so anyway When I landed I simply duplicated the take-off—landing in a turn, and I am sure that no one at the field knew anything about my trouble

Again—and it might have been intentional but I assure you it wasn't—I pulled off the other wheel in front of all the welcoming group at the Washington airport To me it was pretty sad but again it demonstrated that a landing gear failure may be an event in the life of an airplane, but not in the life of the pilot. With the old fashioned landing gear it might have been disastrous, but with the three-wheeled gear it was only an incident

I have not yet flown the Weick, but I have reports on its performance that are very encouraging In its original form it was described in AVIATION for July 1934 Since that time it has been down at the Hagerstown plant of the Fairchild Aviation Corporation for certain modifications, and has lately been returned for tests at Langley Field The recent tests have demonstrated one feature of the three wheeled landing gear that had heretofore been claimed but not proven The Weick plane has not only been taken off and landed successfully in a 90 deg crosswind but this performance has been attained without any use of the rudder

The take-off performance of the Weick is what I consider ideal In tests to determine the minimum distance required to clear an obstacle the best result was obtained without using the stick to take off Simply opening the throttle and steering down the run-way was all that was required The ship did the rest This cannot be done with the Waterman as it now stands but it may readily be modified to do likewise I do not know about the Hammond in this respect

In both the Hammond and the Waterman some of our original requirements have been met by limiting the elevator travel so that it is impossible to stall the airplane, except perhaps by a sudden pull-up [For additional discussion of this method of producing anti-stalling characteristics, see page 17 this issue] Although it is believed that this method of limiting the stall results in a safer airplane than one which can be stalled and which will readily fall off into a spin from the stall, it also results in a minimum speed considerably in excess of the normal stalling speed Unless the airplane is designed with an unusually light wing loading it follows that the landing speed must be relatively high This is not particularly alarming in making landings where cleared spaces and good runways exist, especially with the three-wheeled type of undercarriage (With a properly designed undercarriage of this type, it is always possible to glide into the ground at normal sinking speed without attempting to level off) But our original specifications for these airplanes were based on conditions surrounding a forced landing, and we asked for a minimum speed of 35 m p h Under considerable pressure we were induced to raise the limit to 40 m p h in the current specifications for the 25 airplanes to be purchased by the Department Recent experiences, however have sold us again on the need for reducing the minimum speed and it is my hope that before long we may have airplanes which can be settled into the ground with a vertical speed approximating that of a parachute, and with a forward speed low enough so that any collision after landing would not result in serious damage to pilot and passengers

The Weick W1-A has been returned to Langley Field for testing after modification at Fairchild's Hagerstown factory Combination slot and aileron at mid-chord is designed to eliminate use of rudder in normal turns Ship has been landed and taken off in 90 deg. crosswinds without use of rudder

Department Projects

Pictorial record-of-progress of the Department of Commerce light plane program. Strictly unconventional are the Weick, the Waterman and the Hammond. More familiar formulas are used in Fahlin's Plymacoupe and Arrow's Arrow. Missing is the Curtiss-Wright Sparrow, now testing at St. Louis, but on which details are still lacking

Above: Subject of the Geisse transcontinental test, the Waterman Aeroplane Completed early in May it was recently (and exhaustively) test flown in California's Mojave Desert. When submitted to the Department it is reported to have met the specifications in all particulars.

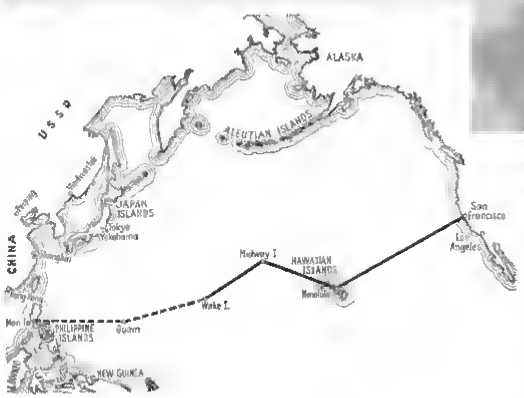
Right: The Hammond Y now back at the Ypsilanti plant undergoing changes to boost its top speed. In other respects reports say that it has met the D of C specifications Power plant is a Menasco C-4 Pirate Wing spread is 40 ft length overall, 28 ft Empty it weighs some 1,420 lb, loaded 1,750 lb.

Left: Another automobile conversion job the Arrow (by Arrow Aircraft and Motors Corp of Lincoln Nebraska) with Ford V-8 engine Changes involve only the cooling system and installation of reduction gearing for propeller drive First ship has been sold to the Department of Commerce for test Plans are under way for commercial production at a price in the neighborhood of $1,500

Right: A step in the direction of a cheaper power plant Fahlin's monoplane is fitted with a modified Plymouth automobile engine Details of the engine conversion were given in Aviation for August (page 35)

Clipper Gear

Accessories, instruments, gadgets aid Pan American's Pacific project



By S. Paul Johnston

Associate Editor of AVIATION

AS we write, NR-823M, the Pan American Clipper, has completed her third Pacific cruise. This time the objective was Wake, a mere speck of land in a vast ocean beyond that mysterious date line where today may be either yesterday or tomorrow. First Hawaii—then Midway—now Wake. Two more short jumps and the shores of Asia will be in sight. Thus, step by step, thrust by thrust, the conquering of the Pacific.

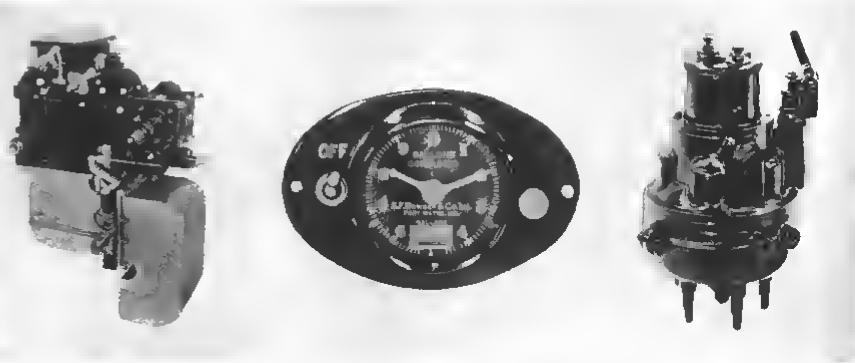
Of all pioneering projects since the Phoenicians struck out through the Straits of Gibraltar, none has depended less on luck, more on long and patient engineering, careful planning, and exhaustive attention to minute detail. That efficient ships, reliable engines and trained pilots were prime requisites is obvious. Less likely to come to mind are the hundred-and-one smaller items tucked away in odd corners, most of them out of sight, on which may depend in critical times the well being of the ship, the crew, the entire program. Many an expedition that deserved a better fate, has failed from lack of appreciation of just such things.

Nor is it always possible, even with the best of planning, to foresee all contingencies that may arise, all special requirements that must be met. Frequently a research program must be well under way before some of the missing links may even be recognized. Gaps in the regular pattern of atomic weight series have led to the discovery of unknown elements, and irregularities in astro-physical phenomena have pointed the way to hitherto unsuspected stars. Thus when trans-Pacific flying passed from the "paper" stage to the practical, new problems cropped up that had never before been considered as urgent. Some are already well along toward final solution. There are still others into which ambitious inventors may well sink their teeth.

Look first to the structure of solid accomplishment—at many of the items without which the success in the Pacific would have been largely a matter of luck rather than of good management.

Of the Hamilton Standard controllable pitch propeller and the Pratt & Whitney automatic mixture control, we have already written in AVIATION. Suffice to say here that in Pan American's Pacific work both have been performing satisfactorily, have contributed greatly to the success of the venture. So far, the Hamilton-Standard constant r.p.m. device has not been in use, but will be fitted shortly. For the present also, the power control situation has been met by working out a series of simplified tables for pilot use.

In connection with routine operation of the Clipper, the Sperry automatic pilot and the directional gyro have been playing important roles. The gyropilot has proved an important auxiliary by relieving the pilot at frequent periods of the actual physical activity of manipulating the plane's primary controls. With its further development it is counted upon to perform an even more important function through more positive control of course and altitude, theoretically possible with the gyroscope, a further developed instrument will materially aid in allowing the pilot to maintain the most efficient operation of plane and engines.



Controllable pitch propellers, automatic mixture control and accurate means of measuring gasoline consumed are important contributors to Pan American's Pacific success. The dial in the center is the indicator and totalizer for the Bowser meter shown at right.

Sperry gyropilot artificial horizon and directional gyros in the Clipper's cockpit relieve the human pilots of flying fatigue, provide invaluable aids to accurate navigation.

Radio compass supplements celestial navigation and the bearings given in the pilot from shore stations. The guy wires of the radio mast form its antenna system.

As a relief instrument alone, however, it has proved to be very worthwhile.

A close watch on engine temperatures is an important check on operations. On the Clipper complete potentiometer equipment (by Lewis Engineering Co. of Naugatuck) makes possible the reading of temperatures at some eighteen or twenty critical points around the four power plants.

Most satisfactory device for fuel measurements so far produced is a modified form of Xacto meter developed by S. F. Bowser & Co. This is a positive displacement type meter with remote reading indicator for cockpit mounting. Installed, each meter weighs about 12 lb. Five of them are used on the Clipper, one for each engine feed, and one between the reserve and the main fuel tanks.

The Pioneer bubble octant and Longines chronometers are the "first line of defense" in primary navigation on the Pacific. Allowing more rapid and simplified computations, adaptable without an horizon as well as with one, the octant has proved highly efficient in complicated navigational problems.

Radio is, of course, an all-important adjunct to the other navigational devices. Not only is the ship given periodic bearings from two or three shore stations, but it is also equipped with a radio compass and homing device which can be tuned on any ship or shore radio station. All radio equipment, both navigational and for communication, was developed by Pan American.

Most interesting, perhaps, of the new equipment developed for Pacific navigation is the Kollsman drift indicator. This instrument consists of a telescope with cross-hairs fitted with horizontal and vertical bearing plates graduated in degrees. It may be used as a drift or ground speed indicator (by taking sightings on fixed points on the ground) or as a pelorus for reading azimuths of celestial bodies, for navigating purposes.

To provide a fixed point for reference on the surface of the ocean, a number of bomb devices have been tried. Most common is the smoke bomb designed to give off a column of dense smoke upon impact with the water. Smoke bombs have been used on all the Pacific flights but have been found to have somewhat limited visibility (five or six miles) even in good weather. Seeking for something that can be seen at greater distances, Pan American has lately developed a type of bomb which consists of a glass shell containing about 1 lb of aluminum bronze powder. Upon impact, the bomb bursts and the finely divided particles of aluminum spread rapidly on the surface of the ocean, producing a bright spot that may be seen for ten or twelve miles under reasonably good conditions. For night work, in good weather, flares have proven quite satisfactory.

So much for past accomplishment. Consider now the gaps in the picture, the spots that need filling.

For years, aircraft operators have been interested in having means at hand to measure engine output directly, a continuous-reading horsepower meter. As Allen and Oswald have developed in these pages, power control at all times is of utmost importance. Now we must get at it by indirection—through a computation based on secondary phenomena—manifold pressures, engine r.p.m., outside air temperatures and pressures. The method is useful, but still not quite good enough. For inventors, then, note No. 1: a direct reading horsepower indicator.

Lacking (for the moment) a direct acting power meter, some sort of lightning calculator, a slide rule for the solution of the cruising control chart is indicated. Some suggested means have already been tried. They work—but for the most part they suffer from excessive weight, high cost, complication. No. 2, then for the inventor's notebook: a cruising control calculator.

Closely associated with power output is the question of fuel consumption. Better means must be found for checking rate of flow to engine, quantity of fuel in tanks. Obviously, in working over long stretches of open water, nothing could be more embarrassing than errors in rate of consumption or in estimating the fuel on hand. Accurate totalizing flow meters may now be had, but they leave something to be desired, especially from a weight standpoint. Tank gages are generally unreliable except in steady flight and only for certain airplane attitudes. Nos. 3 and 4 on the list, then, might well be a lighter and less expensive rate of flow meter, a tank gage that is accurate under all conditions.

The newly developed Kollsman drift indicator may be used, as above, as a pelorus for celestial observations or as shown to the left, to check drift or ground speed.

Drift indication and ground speed determination are clearly important. The newly developed drift sight used with bombs and flares gives good results when good visibility conditions obtain. When flying in fog, however, or above cloud layers, visual references are out. Perhaps the answer lies in some sort of radio transmitter bomb that may be dropped overboard, and its signals picked up with a directional receiver, Item No. 5, then a universal drift and ground speed meter.

The reverse of the problem is encountered in connection with upper air soundings from ground stations when heavy overcast or low ceilings prevail. Here is another tempting morsel for inventors. Item No. 6; an observation balloon equipped with automatic functioning radio transmitter whose use, in connection with the radio compass, will provide an accurate account of the wind velocities and direction "on top."

But the list might go on indefinitely. These samples have been given merely as hints of the sort of thing that will undoubtedly appear as trans ocean work develops. These, then, represent the more obvious gaps to be filled in the atomic table of our accessory equipment for over-ocean flying.

Smoke bomb substitute. This glass container (an ordinary chemist's flask with a simple set of stabilizer vanes fastened to the cork) contains aluminum powder which makes a bright spot on the ocean's surface visible for many miles.

Stalled!

When the author spent most of his time flying free balloons and airships he didn't worry about their stalling characteristics. He found it otherwise with airplanes, however, and ever since has been giving much of his time and energy to doing something about it.

By Ralph H. Upson
Aeronautical Engineer

OLDTIMERS will recall the three basic rules for safe flying. First, *Don't Stall*, second, *Don't Stall*, third, *Don't Stall*. Obviously the importance of these fundamentals is still not appreciated. Recently published Department of Commerce statistics show that in non-scheduled flying roughly half of all serious accidents are still due to stalling. Taking the commercial pilots by themselves, the record is better, but none too good. About a third of the accidents in this subclass are due to stalling. Only in regular airline operation is this type of accident reduced to unimportant proportions. There, pilots are highly selected and thoroughly familiar with their ships, and with large airports available plenty of reserve speed may be maintained in take-offs and approaches.

It has been the time honored custom to attribute practically all stalling accidents to "Personnel" or "Pilot's Error." But if this were as far as the analysis could be carried, there would be small hope for improvement. For about a quarter of a century now, the great danger of stalling has been well recognized, yet every few days some supposedly good pilot manages to stall and spin in. This is the sort of accident that happens only to the other fellow. And of course it is his fault. Like the man who falls down an unguarded elevator shaft—he should have watched his step. In this respect, aviation is just about where it was 25 years ago. We still leave the shaft open and unguarded. We still patronizingly call down to the victim, "You should have watched your step."

What makes a stall?

Any campaign against the stalling danger today must necessarily involve three principal elements: the pilot, the airplane, and the instruments. But the pilot is still the logical starting point for further analysis. From his point of view, then, consider briefly several conditions which may lead to an inadvertent stall and incipient spin. Most commonly they include: (1) premature take-offs, (2) excessive angle of climb, or prolonged zoom, (3) climbing turn, (4) skidding turn, (5) change of power, (6) insufficient power for the load carried, (7) watching the ground, (8) deficient vision, (9) vertical gusts, (10) glide "stretching", (11) sudden raising of flaps, (12) premature leveling off. Of none of these items can it be said that in itself it is *the* dangerous condition. All are factors. Some are likely to be emphasized more than others. For example the average instructor insists rightly on properly banked turns and adequate gliding speed and warns against down wind turns. Potentially the most serious are combinations of various conditions such as 6 and 7, or 8 and 9. Thus, telling a student merely not to stall would be something like telling a beginner at swimming not to drown. He is faced with at least twelve rules to follow—unless some can be eliminated or co-ordinated. To eliminate some of them we must go back to the basic design of the airplane.

Influence of design

Premature take off can be absolutely prevented by the simple expedient of limiting the ground angle to what is equivalent to a safe angle of attack for climbing. Four objections to this might be raised: (1) dragging the tail-skid on the take-off, (2) inability to stall up over low obstructions (it would be interesting here to get a census from a hundred pilots doing non-scheduled flying as to how often such an ability has been important), (3) necessity for curving more gradually into the path of maximum climb (this can be shown both by theory and experiment, to involve no appreciable sacrifice in ability to climb over an obstruction of any substantial height), (4) dragging the tail on landing. As against these objections (of which only one has possible justification) the novice pilot is relieved of a very real dan-

ger which has caused many a minor crack-up, and some serious ones.

An excessive elevator angle in climb can be avoided by simply limiting the elevator movement. To retain reasonable zooming qualities the limit should be set, not at the angle of theoretical maximum climb, but at the maximum safe angle with respect to stalling. Practical operating conditions, including variable center of gravity, make the placing of the actual stop in relation to the stability characteristics a matter of compromise based on practical judgment.

Another frequent cause of excessive climb angle near the take-off, incorrect setting of the stabilizer, is already being eliminated by the modern style of fixing the stabilizer and trimming with adjustable elevator tabs.

The danger of a climbing turn can be eliminated (or very much minimized) by limitation of elevator movement combined with lateral control features next to be considered.

Lateral control

The best insurance against skidding that can be built into the airplane is adequate dihedral, combined with ailerons that assist the turn instead of opposing it. As it is difficult to slip an airplane of this type, flaps must be relied upon for a steep approach. With properly designed ailerons one of the principal functions of the rudder is eliminated. Another of its functions, counteracting excessive directional stability in rough air, will probably be avoided by the reduction of fin area made possible by improved ailerons.

"I never worry about spins. This ship will pull out in 500 ft.!"

For a single engined ship at least, it is probable that the rudder can be entirely disregarded, as it can be today for many ships in ordinary flight. Although turns will not be as perfect as might be made with all three controls, the most direct cause of a dangerous skid, misuse of the rudder, will become non existent. For refinement of control when desired, as in side-wind landing, the rudder can be hooked up directly with the brake control. Ground looping may be counteracted by the arrangement of landing wheels, as will be pointed out later.

A sudden change of throttle may be a disturbing factor in pitch, roll and yaw, all three of which tend toward stalling or spinning. The tendency of a ship to nose up with increase of power is inseparable from its stability characteristics, and is quite proper; but in many ships the effect is unduly exaggerated by the down force on the tail due to the slip stream. With the right proportions and relations between the propellor, wing and tail there need be no appreciable stalling tendency involved in any ordinary flight maneuvers.

The case of stalling due to sudden loss of power is usually serious only in combination with items 2, 3 and 4, for which the same design remedies apply. The rolling effect of a power change, not usually serious, is a direct function of the horsepower and r.p.m., which can hardly be avoided, except perhaps by some sort of automatic device operating a small trimming aileron. The yawing difficulty is obviously most serious in a two-engined combination with one engine dead. This can be reduced by proper design proportions, and practically eliminated by a relatively simple automatic compensator. For merely insufficient power (due to faulty valves or ignition) the limited elevator movement is the best safeguard.

"You should have watched your step"

Recovery from spins

So far we have been engaged in making the airplane harder to stall or spin. This immediately raises the old

superstition. "Hard to spin, hard to pull out." It is quite true that such has often been the case, but there is no reason why it need be so. A spin is a very complex phenomenon, but it needs no abstruse reasoning to show that recovery is never going to be made more difficult by limiting the *upward* elevator movement. Other factors can be treated similarly; it all depends on how it is done. Much study and research have been put upon the spin. It is the kind of problem that is very attractive to mathematical physicists because of its dependence on a nice balance of forces involving fairly definite, though complicated, equations. It seems probable, however, that most of this work will eventually become obsolete because of the practical outlawing of the spin itself—the only way to deal with the danger of involuntary spins at low altitudes.

Watching the ground is a frequent source of trouble. Unfortunately, there are situations, where the ground must certainly be watched—"unfortunately" because the usual result when low is to judge turns and speed by reference to the ground. Thus, down-wind turns give an illusion of slipping, which if "corrected" becomes a very real skid. Traveling down wind gives an extra ground speed that is just an April Fool as far as control is concerned. Safeguards in the airplane design will be the same as for items 2 and 4.

In blind flight there is always a chance of going wrong at any altitude, although the danger seems greater when low due to the necessity of watching for possible obstructions outside. From a design standpoint, the problem is much the same as the last one, with special emphasis on the importance of reducing or eliminating the rudder control, yet avoiding pronounced spiral instability. There is considerable difference among present-day airplanes in their suitability for blind flying.

For avoiding a stall from gusts, we want an airplane that tends to set itself in the same longitudinal altitude relative to the approaching air under all conditions, yet without too much oscillation. This means stability, both static and dynamic, which most modern, well designed airplanes have to a reasonable degree.

Glide "stretching"

The sad thing about glide stretching is that, besides being dangerous, it doesn't serve its direct purpose, except quite momentarily. Actually to reach the intended field, even in a cracked-up condition, would hold something of a morbid satisfaction. But to realize the inevitable fact that the crack-up is all for nothing—that the attempted glide stretching has hindered rather than helped—makes the victim a martyr only to the God of Bonehead Plays. Yet, seriously, in the usual airplane how is the pilot to afford excessive up elevator? The most complete answer is, of course, a function of observation and instruments. But the elevator stop already mentioned is a safeguard that can be applied to the airplane itself. Here it must be taken into account that there are situations, such as the immediate approach to the ground, where one often wants more elevator angle than in a steady glide. It seems that the best solution therefore is a sprung stop, set for average conditions of safe climb and glide, but having more movement in reserve for special cases where full up elevator is essential.

The use of flaps increases the number of factors to be taken into account. With correct design, the flaps introduce no directly harmful pitching moment, but if they are suddenly raised at minimum speed the loss of lift will cause the ship to settle more sharply till it recovers the speed necessary for its normal support. One design solution is to make the flap gear intentionally slow, say by a crank. The suggestion has also been made that the flap gear be coordinated with the throttle lever. With the flaps balanced and otherwise proportioned to suit, this seems feasible, but for smooth control, the flap and throttle functions should overlap to a considerable extent. The actual operating lever should be split to permit a partial flap angle with full power (if desired) for take offs.

"I broke all the landing rules but not the ship!"

Landing accidents

By far the largest number of stalling accidents, particularly of the minor type, occur in landing. These appear in the statistics as "landing" rather than "stalling" accidents. Here, of course, the stalling is not accidental, but intentional. Besides the inadvertent stalls already discussed, many other accidents are due, directly or indirectly, to stalling, and there are very few landing accidents in which the risk would not have been substantially reduced by improvements incidental to eliminating the stalling requirement. Doubtless, this statement will immediately be questioned.

What about overshooting the field? This is certainly due to coming in too fast. But the direct cause of the accident is the floating while waiting for the stall.

What about running into a local obstruction due to lack of vision? Here the main trouble is in the high nose position required by the stalling attitude.

What about nosing over? No nosing over would be possible if the wheels were much further forward. They are not put further forward because of the necessity of getting the tail up for the take-off, and this in turn is only necessary because of the large ground angle.

Under-shooting, bouncing into the air, rolling over on one wing may similarly be ascribed, (1) to the necessity of picking the landing spot far in advance (2) to the ground angle being larger than the angle-of-attack in glide and, (3) to lack of positive control, all due mainly to the requirement for a stalled landing. Even ground-looping

can be shown to be connected with the type of landing gear designed for the conventional stalled landing

Landing gears

More detailed analysis is beyond the province of this article, especially as the desired results do not depend on any one specific item or arrangement superficially considered While allowing for various incidental factors, the main principle is to limit the nose-up angle that can normally be attained in the air and to flatten the ground angle still more. With flaps, the ground angle can be made particularly flat, due to the steep gliding approach and the use of a moderate flap angle for take-off The low ground angle incidentally improves directional stability at the stall by permitting more fin area below the fuselage. A tail-down landing can still be made, to the limit of elevator movement by dragging the tail. If a conventional tail wheel is used it must be given a shock-absorber travel comparable with that of the main wheels In this case, however special attention in the design is necessary to prevent ground-looping

One effective landing gear arrangement, the first serious attempt to improve present landing methods, is represented in the Stout Sky Car A similar arrangement is used in the Weick design, and in the Hammond monoplane now being built for the Department of Commerce The main idea, two wheels set somewhat back of the center of gravity and a third well forward, is old, having been used by the first Curtiss biplane and other early ships. The principle of landing at a relatively low angle of attack goes back to the original Wright airplane on skids It is difficult to see sometimes why an essentially good system was abandoned for one with so many faults and with so little to recommend it.

A matter of evolution

What apparently happened was this

Main skids necessarily gave way to wheels for take off purposes As speeds increased, landing on wheels involved considerable ground run which experience showed, could be reduced by the added air drag of a stalled or nearly stalled wing attained by letting the tail down to the ground This also introduced the drag of a tail skid Brakes appeared and were superimposed on the system by merely changing the tail skid to a wheel and moving the main wheels a little further forward It was a seemingly straightforward development, yet the same arrangement that was fairly logical without brakes was in almost every respect unsuited to the use of brakes. Moving the wheels forward increased bouncing and ground-looping. But they could not be moved far enough to eliminate nosing over The wing at high angle of attack had drag, but it also had lift taking load off the wheels which otherwise would be available for braking force. Even with full-span flaps, a wing at the stalling angle has a drag only about a quarter of its lift, whereas if the equivalent load were transferred to the wheels a brake force about twice that much could be had. Obviously, the brakes are no good at all while the airplane is floating in the air

Here then is the final indictment against the present day airplane Not only is the method of landing inherently dangerous, but, like glide 'stretching," doesn't even get the results Not so much that the conventional airplane *can* be stalled, but that it is *required* to be stalled Thus for the most delicate of airplane operations, the landing, the ship must be deliberately put into an attitude where its control is practically nil It is very much as if the only way to stop a car were to skid it A skidding car has lost its hold on the road a stalled airplane has lost its hold on the air, by its very nature a condition of uncertainty and danger. By eliminating the stalling requirement for landing we can make the ship almost stall proof for all other conditions of normal flight

Control at stall

For several years now research has been carried on seeking to discover stabilizing and control means that would be good beyond the stall. Results are still in the negative It is more than likely that such search is hopeless of success in any more than a very limited sense. Instead of putting more effort on controlling a condition that is essentially unstable and erratic, it seems more worth while now to concentrate on eliminating the stall itself Complete safety from stalls is still dependent on apprehending the close approach of a stall, this being particularly important in an airplane of conventional characteristics.

All authorities on flight training seem to agree on the great importance of teaching the avoidance of stalls For example, from three different authors "He who is master of the stall is master of his ship"; then "It is imperative that instruction (in stalls) be thorough, particularly in recovery from imminent spins"; and "If pilots will — sense the first indication of a stall or spin and correct it at once, there should be little occasion for ever having a crash." As to how to attain this mastery, there seems to be a little more difference of opinion One author emphasizes the importance of periodically feeling out the ailerons in a glide others lean more toward holding the proper position of the nose relative to the horizon, or listening to the noise made by the air, and other minor indications

All such methods suffer from a lack of positive assurance By the time the ailerons get "soft," the ship is already in a position to be thrown out of control by a severe gust The horizon is an uncertain guide at best Even when the horizon itself is perfect, it gives no quantitative information, particularly with respect to temporary departures from the usual angle, and for conditions of varying throttle, or flap displacement. Trying to judge the sound of the air blast in a cabin ship is mere guessing

Recognising the stall

Among the usual instruments, the air speed meter comes the nearest to telling the truth about stalling, but it is known to be unreliable especially at the lower speeds where it is most important to have accurate information The basic fault of the airspeed meter is that it does not give the type of information that is most directly usable from a control standpoint

A stall depends on other things than speed Even without any change in the actual weight carried a stall can readily be induced at considerable *apparent* surplus speed by a sharp gust, a quick pull-back, or a tight turn. Of course it will be said that a good pilot should know all these things and be able to judge accordingly, also that he should not be unduly dependent on instruments. But he should certainly have instruments that give reliable information when necessary to refer to them This not only in blind flight, but under conditions where visual indications are definitely misleading; and under all conditions there should be available a trustworthy reference by which the indications of merely qualitative guides may be properly judged. For such an instrument there is only one possible basis for accurate and reliable information for all conditions, and that is angle-of-attack

Although there are many different ways of getting into a stall, the stall itself represents only one definite condition — excessive angle-of-attack By whatever means such a condition is approached, an angle of-attack meter will show it, and this is the only type of instrument that *will* unfailingly show it Yet on ships with enough instruments to trim a Christmas tree, this one item of basic importance is not usually available

Further detail is beyond the scope of this article, but the principle is clear and in line with the other two elements involved We may now bring the original three rules for safe flying up to date by saying—

To the pilot, "Don't stall "

To the airplane manufacturer, "Don't make him stall."

To the instrument maker "Don't let him stall."

Race Flashes

A tabloid survey of the 1935 Air Races

1935 champion, Mister Mulligan, winner of both the Bendix and Thompson Trophies Power plant is a supercharged Pratt & Whitney Wasp Left Thompson Trophy winner Harold Neumann

A threat that failed to materialize Howard Hughes' racer, built and tested in great secrecy, did not appear at Cleveland. Powered with a Twin-row Wasp, wing spread is said to be under 25 ft

FOR the second time "Mister Mulligan" nosed Turner's ship out of first money when Harold Neumann took the 1935 Thompson Trophy against a field of six. Lap by lap he fought his way from fifth to second place, was finally paced only by Turner's Wedell-Williams. When Turner, half blinded by spraying lubricating oil, was forced to land at the end of the ninth lap Neumann held his lead to the end. Time 40 minutes, 52.4 seconds Speed 220 2 m.p.h.

Three days earlier, with Ben Howard up, "Mister Mulligan" won the Bendix race from Los Angeles by a margin of only 23½ seconds For the 2042 mile course, elapsed time was 8 hours, 33 minutes, 16 3 seconds, average speed 238.7 m.p.h. Turner averaged 238.5 m.p.h.

Neumann, flying Howard's "Mike," took the Louis W. Greve Trophy race on the second day. In the finals he averaged 207.3 m.p.h. to beat Marion McKeen on Miss Los Angeles at 206.4 m.p.h.

In the 375 cu.in. class finals Arthur Chester on his Menasco-powered Chester Special averaged 200.6 m.p.h. to beat Lee Miles in second place, and S. J. Whitman in third.

Mrs. Melba Beard of California outdistanced a field of seven women flyers to take the Amelia Earhart Trophy

Time lap and 23½ seconds kept Roscoe Turner from the Thompson and Bendix Trophies.

Marion McKeen flew the Brown built, Menasco powered "Miss Los Angeles" in the 1935 Races

AVIATION September, 1935

An explanation of the Rossby diagram used in air mass identification and study. A fifth in Aviation's series on the elements of modern meteorology.

Air Mass Chart

By Philip Del Vecchio and Daniel Sayre

NOTHING is more important in studying air mass theory than a complete grasp of the conservative properties which air masses retain long after their other characteristics have been modified. Basic are specific humidity and potential temperature.

Specific humidity is the actual weight of water vapor present in a unit weight of air. In modern meteorological units it is usually defined as the number of grams of water vapor contained in a kilogram of atmosphere. It is not hard to compute. Most text books and manuals on meteorology contain tables of the pressure exerted by saturated water vapor at different temperatures. Multiplying this quantity by the relative humidity of the particle under consideration gives the pressure exerted by the moisture in it. Specific humidity then follows from $q = \frac{622\ e}{p}$ in which q equals the specific humidity in grams per kilogram, e is the vapor pressure, and p the total atmospheric pressure. In analyzing air mass sources specific humidity is infinitely more reliable than relative humidity. It does not change with every variable as relative humidity does. Even though it does change after precipitation or the slow movement of the mass over large bodies of water, a meteorologist can estimate and allow for such changes by following the travel history of the mass on daily weather charts.

Potential temperature is temperature adjusted for an adiabatic (without gain or loss of heat) descent of the particle to standard pressures—in usual practice to a pressure of 1 000 millibars. Approximately it is temperature adjusted to sea level. It can be calculated from the formula $\frac{T}{\theta} = \left(\frac{p}{1{,}000}\right)^{0.286}$ in which T is the temperature in absolute degrees (centigrade + 273), θ is the potential temperature, also in absolute degrees, p is the barometric pressure in millibars.

Much more easily and quickly, potential temperature can be read graphically from the adiabatic chart upon which the sounding is first plotted. Fig. 1 is based on the chart used in the July issue of AVIATION. The sloping lines of reference are plotted to indicate the adiabatic lapse rate—one degree centigrade for each hundred meters of altitude. Take for an example the temperature at 570 meters, 7 deg. centigrade below zero. If a line is drawn through it parallel to the nearest adiabatic line it will intersect the 1 000 millibar horizontal at one degree below zero centigrade (272 degrees absolute). This then is the potential temperature of the air in our example at 570 meters. The potential temperature of the air at 1 190 meters is found to be 274 deg. absolute, and so on for any point. Since each adiabatic line represents a line of constant potential temperature, most such charts in use come with the potential temperatures printed directly on them.

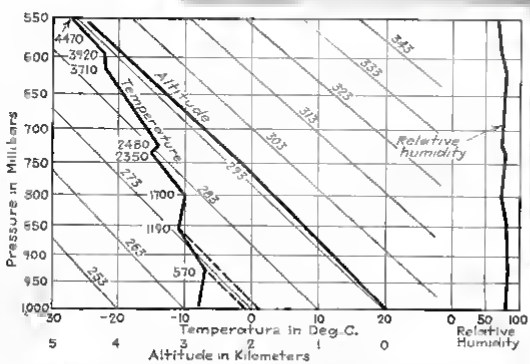


Fig. 1. Graphical determination of potential temperature is simply done on the adiabatic chart. Through points on the temperature curve where its slope changes lines are drawn parallel to the nearby adiabatic lines. The intersections with the 1 000 millibar line indicate the potential temperature. Thus the potential temperature of 570 meters is found in this example to be 1 deg. below zero C (272 deg. Absolute). That at 1,190 meters 1 deg. above zero C (274 deg. Absolute).

Once determined, the potential temperature remains independent of the lifting and falling of the air mass due to passage over irregularities of terrain or interaction with other air masses as long as no condensation or precipitation results. Obviously therefore it remains much more nearly constant than ordinary temperatures.

The Rossby diagram is in principle a plotting of specific humidity and potential temperature against each other. To be absolutely accurate, it is a plotting of two slightly different quantities—the potential temperature corrected to allow for the effect of water vapor, and the specific humidity likewise corrected. But these corrections are small and for our purposes not necessary. Formulæ for the precise quantities were given in the July article.

The reason these quantities are used is to permit plotting of diagonal lines on the diagram representing what is called *equivalent potential temperature*, more accurately a function of the corrected values than of the simpler quantities.

This equivalent potential temperature has special significance in considering problems of atmospheric equilibrium.

The common procedure in plotting such a chart is to extend the table form shown in July. Values for the sounding used as an example now become:

Altitude (meters)	Pressure (millibars)	Temperature (Deg. C.)	Relative Humidity (per cent)	Specific Humidity	Potential Temperature
Surface	999	— 0	91	1 0	265
570	929	—7	94	2 4	272
1195	856	—11	93	1 8	274
1700	806	—16	81	1 0	281
2358	755	—15	98	1 5	282
2488	723	—14	86	1 5	284
3710	613	—22	86	1 0	296
3920	597	—22	83	0 8	293
4470	553	—27	82	0 6	293

We can then enter the values in the last two columns upon a Rossby Chart with sufficient accuracy to illustrate the procedure. Opposite each point we write the elevation and whatever cloud formation notes have been furnished by the sounding pilots. The resulting graph is shown in Fig. 2.

The most direct use of the chart is in the identification of air mass types. Prof. H. C. Willett of M.I.T. has carefully coordinated over 1,500 American soundings with analyses of mass positions on daily weather maps. In his paper "American Air Mass Properties" (available from the M.I.T. Department of Meteorology, Cambridge, Mass.) he presents average Rossby characteristic curves of each important type of air mass at various sounding stations. Figures 3 and 4 give an average of these averages for "the Eastern United States."

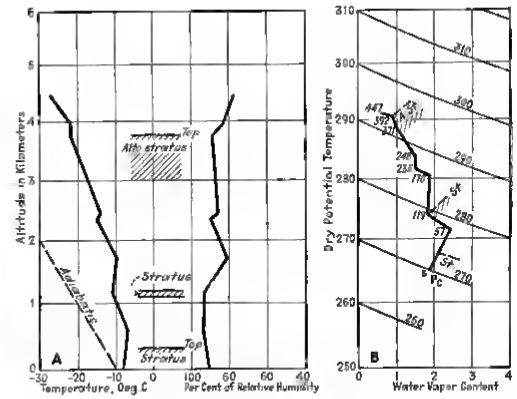


Fig. 2: The Rossby Diagram for our sample sounding. A winter observation. It is obviously Polar Continental air throughout.

Note the clear spread in the first chart between the three types illustrated, especially between Polar Continental (Pc) air and Tropical Gulf (Tg) air. Note the extreme dryness of the polar mass at all elevations, its rapidly increasing potential temperature, almost 40 deg. in four kilometers.

The typical Gulf mass by contrast is extremely moist at the surface, contains over two grams per kilogram at four kilometers elevation. Its rate of potential temperature increase is much lower.

Intermediate is the air that has come from the North Pacific (Npp). At higher elevations it has lost large portions of its moisture. Even at the surface its moisture is much less than that of the tropical average, though still moister than the extremely dry continental masses. Fig. 3 is based on winter figures. Differences are marked making identification comparatively positive.

But in summer the uniform snow cover which has made the continental mass so distinctive has disappeared. Pc takes on almost the exact characteristics

of the winter air from the Gulf regions and has become indistinguishable from polar summer air from Pacific sources. Gulf air in the summer is still more moist and increases in potential temperature even more slowly than it did in the colder months. It is still possible in summer months to distinguish between air masses from widely different sources, but it must be borne in mind that in summer, air mass identification is almost always less certain than in winter.

Other features of the diagram give indication of dynamic characteristics of the air mass which have direct importance. The great difficulty experienced in altitude-temperature charts in distinguishing between overlying warm air masses and inversions due to other causes are removed, partly because the Rossby chart enlarges the differences of dissimilar air masses, also because a sounding through a front when plotted on the Rossby is wedge-shaped to the right and shows a well marked vapor content maximum somewhere in mid-air. (See Fig 5.) Non-frontal inversions display no such maxima but run in regular fashion from right to left with increasing altitudes.

Distances between points on the curves marking kilometer levels take on a definite significance. With complete mixing in a layer due to turbulence the potential temperature and specific humidity soon becomes uniform at different altitudes. The characteristic line for such a layer would shorten toward a point. On our examples, Polar continental air has a shorter curve for a four kilometer sounding than the Gulf masses, is therefore generally more vertically uniform.

Finally, characteristic curves yield a great deal of information about the vertical stability of the various layers. In previous articles we have developed the idea that if an unsaturated mass increases in temperature at a rate greater than one degree for each hundred meters of altitude any vertical movement once started within it will continue. That is, it would be in a condition of vertical instability.

Unfortunately for the simplicity of our treatment, it is necessary to enlarge on the stability concept and explain that Rossby distinguishes between three degrees of stability, not two. When the air reaches its saturation temperature (dew point) the rate at which it would cool with further adiabatic lifting becomes less rapid than the degree per hundred meter rate. Just what that rate would be is called the condensation lapse rate, and varies with different conditions of temperature and pressure.

Atmospheric layers frequently exist whose lapse rates are less than 1 deg per hundred meters but are greater than the condensation lapse rate. Such layers resist movements downward but, if near the saturation temperature, are very likely to be started into upward convective activity. Such a state is called conditional instability.

Added to the chart then are families of curved diagonal lines representing the equivalent potential temperature. A rule follows. If a layer's characteristic line slopes downward to the left with increasing altitude it is unstable regardless of its moisture content, if it slopes upward toward the left less than nearby equivalent potential temperature lines, it is conditionally unstable. If it is steeper than those, it is absolutely stable.

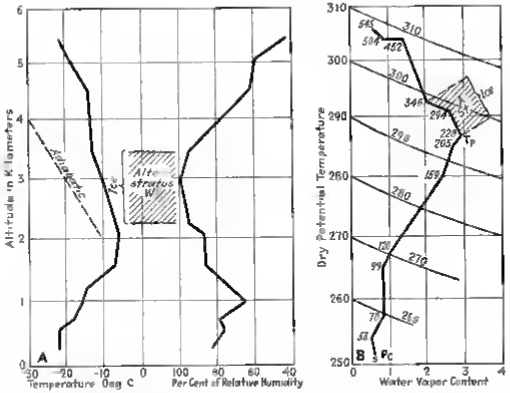


Fig. 5. A diagram for another winter-time sounding showing an air mass of Tropical Pacific origin over-running a Polar Continental mass. Note the humidity maximum at 2,980 meters and the general wedge shape of the curve.

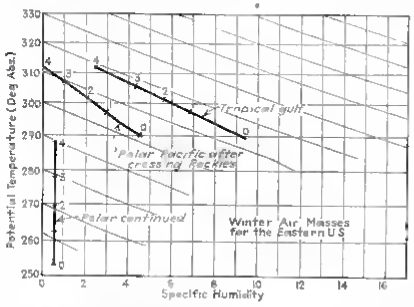


Fig. 3. Average characteristics of air masses will be different at each sounding station because air masses will travel over different average paths. In each case. Note the wide spread between the curves for the three most important types.

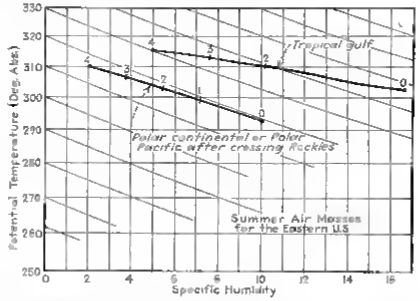


Fig. 4. In summer the snow cover has disappeared from the sub-arctic regions and American masses become much less easily distinguishable. But air from the Gulf of Mexico is still much more moist and warmer than air from other sources.

EDITORIAL

AVIATION
Edward P. Warner, Editor

Flying Service Decalogue

FOUR thousand years before the rise and fall of NRA there was a code in ten short sections designed to control the total of all human relations. Lives of fixed base operators are not as simple as were those of the followers of the Prophet of Sinai. With some difficulty we have kept the subdivisions of our decalogue to ten. Although they bear a certain resemblance to the Original Ten, there are many points of difference. Realizing their limitations we submit them with due humility.

1. Thou shalt not covet

Thou shalt not covet thy neighbor's ships, nor his students nor his field, nor anything that is thy neighbor's. Go out and build a better business for yourself.

THAT may sound like a rather large order and it is. But it has been done and can be done again. The trouble with aviation is that it fascinates us, makes us forget it is a business not a lark. It is more than half the battle to realize that flying service operating is a form of labor and, as such, is susceptible to all the venerable but distasteful principles of hard work, development, and growth.

It is not surprising then that some of the most successful operators are men who have been successful in other forms of business—banking, baking, butchering. In fact the village blacksmith sometimes makes a better airplane operator than the famous pilot. The smith isn't handicapped by glory. He is blessed with the humility of the grocer or the cobbler who believe that the customer is always right. And if the cobbler's customer expects always to be right, much more is expected by the purchaser of high priced transportation.

There is a lesson to be learned from every merchant in your own community. The storekeeper has his sale days and loss leaders. The appliance dealer has his highly organized commission sales force. And the manager of the local motion picture theatre (of whom more later) furnishes a profitable example, for he sells entertainment, which is after all a large part of the stock in trade of the fixed base operator.

2. Love thy neighbor

Love thy neighbor as thyself. He may be a Rotarian, a Kiwanian, or a pillar of the church. Or, if he is not, he may know someone who is.

THERE is no better way of promoting business than speaking before clubs, fraternal organizations, or even church societies. And don't neglect opportunities to address the ladies' auxiliaries. In fact it may even be necessary to play bridge to harness the gossips and get them working for you.

Word of mouth advertising is not the only benefit derived from such contacts. Always invite them to inspect your airport. Show them lantern slides or pictures of your operation. Sell them the idea of coming to the airport for the next outing. Offer a special short ride rate to get some of them into the air. Every organization has prospective flying students, charter customers, industrial plane owners.

But whether or not you have visitors, keep your house in order. And that includes personnel. The best way to dispose of the circus type of employee is to send him over to work for your competitor.

3. Cast bread upon the waters

It is more blessed to give than to receive particularly when, by giving just a little, much may be received. Sow thy seed on good ground and it will multiply.

RADIO advertisers and others have learned that a trifling premium sometimes paves the way to business representing many times its value. A free hop for the holder of the lucky numbered ticket to

the local movie palace would publicize the service, please the movie manager. He might even be willing to trade a short advertising flash in exchange for poster space at your hangar.

One advertising premium that any operator can afford is a small coupon on the flight ticket certifying that the holder has been a passenger of John Doe's flying service. The customer may keep it to boast about his ride, or he may throw it away where someone else will find it.

More elaborate premiums may be given to regular customers but, if expensive gifts are used, it is often more effective to present them on a contest basis. One operator has developed a substantial fishing trip business. He offers a long list of prizes for evidence of piscatorial skill. And most of the awards are sponsored by local merchants who welcome the opportunity, charge it to their advertising budgets. The operator finds himself directly in line for the incidental publicity. Treasure hunts, clam bakes, outings, all have the double advantage of producing publicity, getting the public to the airport.

4. Cry out from the housetops

If the better mousetrap builder had advertised his address it would have helped the world find the way to beat his path to his door.

SOME methods of advertising flying service have been discussed in other commandments. There are many others. It always pays to have some one in your organization who is publicity conscious. If you can't afford a full or part time publicity man, you can afford a few short rides for local newshawks. Then all you have to do is something for them to write about. Get out a weekly news release for Monday local papers. Monday morning papers are always hard for editors to fill.

A direct mail campaign is no stronger than its mailing list and therefore is usually unsatisfactory. Highly selective lists are expensive to develop but are the only ones that produce results. One enterprising operator, however, took inexpensive photographs of the town's most imposing residences, sent them to the owners with letters about his service.

Cooperative circular dropping campaigns with local merchants are sometimes helpful, particularly if they have a contest element. Offer a free ride, or hat, or turkey to the finder of the lucky numbered certificate. Often the merchant will stand most of the expense, and will help get the story in the papers.

Where two or more operators are gathered together at the same airport, cooperate rather than compete. Pooling advertising appropriations and publicity efforts furnishes one example of what can be done.

5. Prepare a place for them

The hangar waiting room need not be planned along the lines of heavenly mansions, but customers do not like to sit on old drums or dope cans.

AT THE risk of making things too comfortable for the hangar lounger, you should provide respectable waiting rooms—the kind your wife or mother would approve. In fact, feminine ability might be found helpful in selecting the simple but homelike furnishings required to make the best use of that corner selected for those who wait. The space need not be large, can be a wall board partitioned corner of the hangar. But it must *not* be a repository for parachutes, helmets, and dope cans. Many successful operators provide game rooms for students.

And if your port is big enough to boast a restaurant, remember that food quality and attendants' appearance will do more for business than any other form of promotion. Cocktail bars and outdoor restaurants often can be made attractive and profitable and the number of other recreational facilities is limited only by the resourcefulness of the operator.

It's a long walk into town from almost everybody's airport yet there is seldom any other way to go. If no satisfactory arrangement can be made with local bus or taxi companies, or with cab services at airline stops, it should be remembered that a six passenger car may be operated and maintained for as little as 2½ cents per mile (less driver). There may be a source of profit in having one.

6. Believe in Signs

Let not the sign of your profession be eclipsed by those proclaiming the virtues of hot dogs, tamales, chile con carne, or ice cold buttermilk.

IN THE last few years a good many operators have learned about painting signs. But strangely enough, there are many who paint them only on the airport side of their hangars. The roadside is at least equally important. On high speed highways it should be remembered that motorists cannot stop on a dime. Adopt the tactics of the tourist camp operators who start their signboards 20 miles away in all directions. These signs need not be elaborate. Arrows stamped out of metal, painted, stencilled with the words "Airport, 20 miles" are sufficient reminders.

Paint also can be used advantageously on hangars and other airport buildings. Some operators are slow in learning (as surviving auto service station

owners did) that light attracts. The brightest spot gets the greatest number of customers.

7. Seven days shalt thou labor

Eternal vigilance is the price of profit. Remember the Sabbath is the most profitable of all days, for then mankind goes forth in search of worldly pleasure.

FIXED base operation requires but 365 days of work per year. Planning and policy forming has to be done after hours, while shaving, breakfasting, or awaiting sleep. There are always days when flying is impossible, but the widely diversified services require constant supervision, in shop or stockroom.

A certain operator returned to his hangar after a day's absence. He was gratified to find that his associates had made many sales of a certain orange colored dope. On closer examination he discovered that the color in question was one that sold at a higher price than all the rest. His assistants had been charging the standard rate.

If you feel the need for diversion it is best to follow the examples of certain operators who declare a holiday on Mondays, close and lock the door.

8. Honor thine angel

Honor thine angel and thy passengers that thy days may be prolonged, and that it may go well with thee in the business thou hast selected.

IF YOU are fortunate enough to have an angel or even stockholders, conserve them well. Remember that there comes a day in the life of every man when he stops to think about what he is getting for his money. The smaller the deficit the less frequently these days come around. Despite the lessons of 1929, there are still some people in this business who lie awake nights thinking up ways to spend money on projects that are anything but self-liquidating.

It is frightfully simple to hitch onto the back of the modernization bandwagon, but the slogan "Modernize for Profit" must be taken literally, particularly in a subsidized operation. A cold-blooded analysis of just what an improvement or addition to equipment will bring in revenue is the only sound procedure.

New flying equipment is rarely an extravagance. It is a sound investment in reliability and customer confidence. A certain successful operator takes great pride in his ability to cut costs but rarely does he let a season pass without replacing some of his ships.

Competition must be reckoned with in an equipment replacement program. If your competitor is getting by with highly polished arks of 1930 vintage there may be an advantage in putting some new ships on the line. First cost may terrorize you, but remember airplane operating efficiency has been increased in recent years. Not long since the airline operators found they could not afford to fly their old ships. They were scrapped and replaced.

9. Know thy costs

In every business there are men who carry their accounts under their hats. But eventually they find themselves with neither hats nor shirts.

ONE day an operator sat in his car high up on a mountain side, gazing through field glasses at the airport. He was awaiting the gas truck driver's departure with his bill.

Few of the smaller operators know what it costs to fly their ships and, when the month ends, someone doesn't get paid. An accounting system is an inexpensive necessity. If there is no one in your organization with accounting inclinations, a system can be set up at small cost by some consultant or at no cost by the representative of the company furnishing the necessary mechanical equipment for it. After that it requires about $10 worth of labor monthly to keep it going. Such installations pay for themselves in a short time by compensating for forgetfulness, dishonesty, and other forms of leakage.

10. Thou shalt not kill

Dead passengers do not come back to ride again. Neither do they tell their friends about the pleasures of their trip. They do not make good advertising.

THIS is a coldblooded way of saying that airplanes must be maintained. You can't adopt the practice of the shoestring bus operator who leaves his buses where they stop, hangs a red lantern on his crippled charge, tows it home at his leisure. A flying service stands or falls on its maintenance. Here again we have an object lesson in the scheduled air lines.

First requirement is a definite policy for engine overhaul. Three hundred hours is about the maximum allowable time between overhauls for student ships. Some operators have found it economical to follow transport practice, eliminating top overhauls and tearing down completely every 300 hours.

Flying Equipment

The Model 45 Fairchild

A new five-place cabin monoplane comes over the horizon from the direction of Hagerstown.

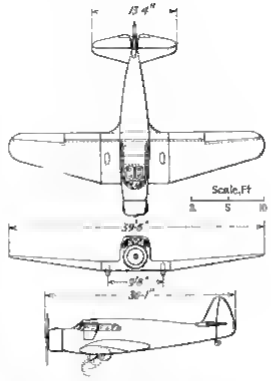
The Model 45 represents a distinct departure for the Fairchild Aviation Corp Save possibly for the high aspect ratio tail surfaces, there is little about the new machine (externally, at least), to suggest its relationship to the deservedly popular Models 22 and 24 It represents a totally new effort from hub to tab

Fairchild engineers have long since been conscious of the sales appeal of an automobile-like airplane In the 45 this concept has been carried to a much greater degree than in prior models Arranged and fitted up like a high-priced sedan, with a broad seat for three to the rear and two separate seats forward, the prospective customer finds himself surrounded in the air with the same sort of arrangements with which he is familiar on the ground

There is little need to be cramped in the Fairchild cabin The distance from the rear wall to the rudder pedals is 110 in The rear seat is 51 in across Behind the back of the rear seat is a shelf 12 in wide where small baggage or miscellaneous items may be placed The main door is on the right side and opens directly into the rear section There is another small door alongside the pilot's seat, on the left side

Control column is of the wheel throw-over type It may be locked in two positions Both sets of rudder pedals are adjustable in flight for length Brake pedals are on the left-hand side and a parking brake lever is at the pilot's left Flap control lever is in the center and the retracting under carriage hand crank at the pilot's left. Tab controls are in the cabin roof where they may be conveniently reached from either seat

The instruments are all grouped in front of the left-hand seat Throttle and mixture control are in the center, convenient to both seats Instruments are rubber mounted and indirectly lighted A master switch is mounted under the instrument panel by means of which all electrical circuits in the plane may be killed when the plane is in storage. A large compartment with a hinged door opposite the right-hand pilot seat makes a convenient place for the storage of maps, or other small articles



The new Model 45 Fairchild shows a top speed of 185 m p h with the 285 hp Jacobs engine turning up 2,333 r p m

Position of the landing gear is indicated at all times by a visual indicator on the instrument board. For safety, a Klaxon horn and a red light on the instrument board are interconnected with the throttle and the landing gear mechanism so that if a landing is attempted with the wheels up, the pilot is instantly warned When the landing gear is fully extended, a green light on the instrument board is lighted

Baggage arrangements are unusually convenient Beside the shelf and the dash-board compartment there are two large compartments, (each 22½x44x16 in) in the center section of the wing, accessible by trap doors in the cabin floor Baggage may thus be easily reached even when the ship is in flight

A heating and ventilating system is installed through which hot or cold air may be valved The amount of heat or of air may be controlled by shutters operated from either front or rear seats Ventilation may also be controlled by opening the sliding windows in the front section of the cabin, and by means of a small vent in the roof

Large windows give an unusually good field of view for the pilot His outlook is further improved by two large transparent panels set into the roof overhead

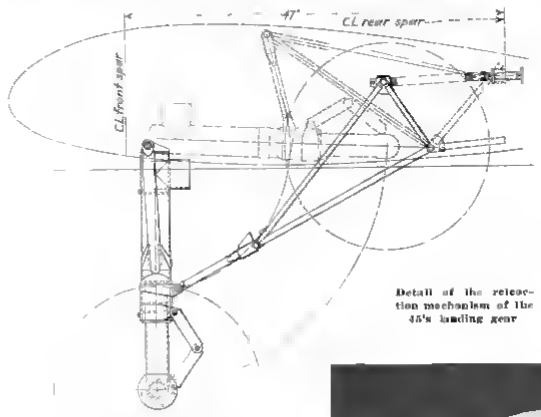
Under the skin, Fairchild characteristics are much more in evidence Basic fuselage structure is welded steel tube (combining round and square sections) The primary structure takes up only about half of the depth of the fuselage the turtle deck and cabin roof being largely of plywood However, there is sufficient steel framing in the cabin roof to protect the occupants adequately in case of a nose-over Fabric covering is used over the entire fuselage except immediately around the nose

The wing varies in sections from NACA 2218 at the root to NACA 2209 at the tip It is rigged with an angle of incidence of 2 deg, dihedral 6 deg The leading edge is swept back 15 deg

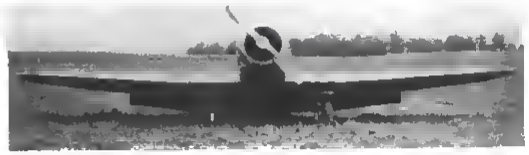
Wing is in three sections, two outer panels, and a center section The outer panels are built up of spruce box-type spars with spruce ribs Drag trusses are of aluminum alloy I section (built up), double wire braced with steel tie-rods. Leading edge is plywood covered back to the front spar, remainder of the panels are fabric-covered

Center section is constructed entirely of aluminum alloy The spars are built up of extruded shapes and plates. The top surface covering is composite, with an inner skin of corrugated sheet riveted to smooth outer skin Leading edge and underside of the center section are covered with smooth sheets. The landing gear, the baggage compartment and the two gasoline tanks (each of 60 gal. capacity) are built into the center section Tanks may be removed by unscrewing cover plates on the underside of the wing

Flaps of the split balanced type extend across the trailing edge between the ailerons Flaps are of special NACA section with a chord of 15½ in. They may be locked in three positions (closed, down 30 deg and down 60 deg) They are hinged back of their leading edges so that when they are deflected the leading edge swings upward and backward and fits snugly against the underside of the wing Due to the aerodynamic balancing, only a slight operating force is required The control to the hand lever in the cockpit is by means of push-pull rods All hinges are on ball bearings Flaps are built up of aluminum alloy tubing with metal ribs Leading edges are covered with aluminum alloy sheet and the rest with fabric.



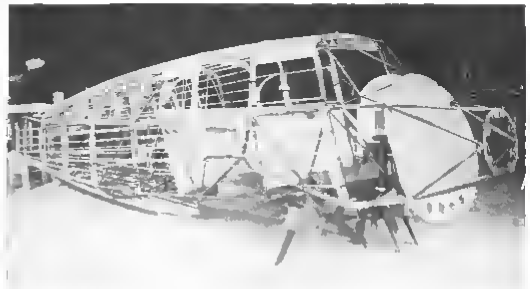
Detail of the retraction mechanism of the 45's landing gear



Now you see them now you don't Front view of the Fairchild 45 with flaps up and with flaps down

Ailerons are of the slotted, balanced type They also are built up of aluminum alloy with fabric covering

Tail surfaces are of full cantilever design built of aluminum and steel and are almost entirely fabric covered Stabilizer and fin are of the two spar type Leading edges of both, back to the front spar, are covered with aluminum alloy sheets Elevator and rudders are of the balanced type built of aluminum alloy ribs, mounted on steel torque tubes, fabric covered Adjustable trimming tabs are provided Control for the tabs is through



A Fairchild 45 fuselage under construction Note combined use of square and round tubing Aft of the cabin section, the fuselage shape is obtained by a deep plywood bulkhead and science steingee turtle deck. Over the cabin the steel work is carried into the roof to protect the occupants

a fine thread screw operated by a cham and sprocket connection via cable to the control handle in the cockpit.

The main landing wheels are retracting, the tail wheel fixed. Each of the main wheels is mounted on a single oleo spring shock leg, (29¼ in long, 3½ in diameter, 7 in stroke) As shown in the attached diagram, each leg is braced by a folding tripod. A nut carried on the tripod engages with a long screw which is attached to the rear center section spar and turned by a crank in the cabin through connecting chains. Molybdenum steel tubing is used for all undercarriage members. Oilite bushings are fitted. When retracted, the wheels extend 11 in below the wing and are free to revolve in case a landing must be made in that position. Wheels are of the semi-airwheel type with hydraulic brakes. The tail wheel is full swiveling and is mounted on an oil spring strut.

Power plant is the Jacobs 225 hp. 7-cylinder air-cooled engine, mounted on rubber to stop vibration. Standard propeller is of wood. Engine is enclosed in a full NACA cowl the side sections of which are hinged so that they may be easily lifted for inspection and maintenance. Sections of the inner cowling are also easily removable for engine adjustment. The oil tank is located on the fire wall and is accessible through a door hinged into the side of the nose cowling.

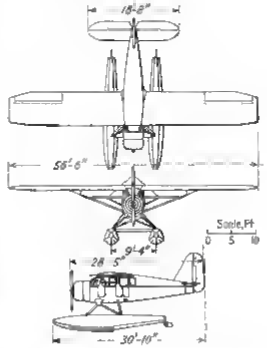
The general specifications for this airplane include: span, 39 ft. 6 in., wing area, 248 sq ft., weight empty, 2,277 lb., gross weight 3,600 lb.; useful load, 1,323 lb., payload, 759 lb.; wing loading, 14.5 lb per sq ft., power loading, 16 lb per hp. The performance figures from flight tests are as follows: cruising speed, 147 m.p.h.; maximum speed, 160 m.p.h.; landing speed with flaps, 48 m.p.h.; landing speed without flaps, 60 m.p.h.; rate of climb, 640 ft. per minute; cruising range, 600 miles.

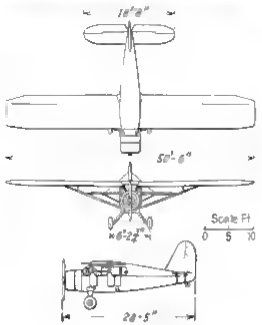
Bellanca Business

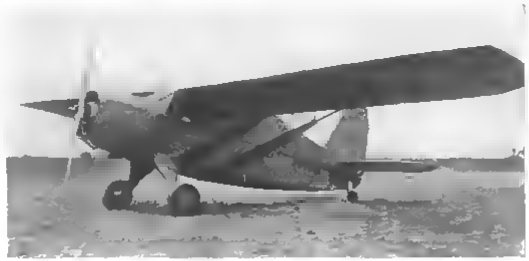
A new Model Pacemaker, the Series Eight; a special Skyrocket for Dr. Light, and a Cargo Aireruiser on floats

SOMEONE looked over our shoulder when we had the Bellanca material spread out on the desk preparatory to writing this article and said—"There is a good-looking airplane." There has never been any question but that Bellanca Aircraft were efficient, or that they were well cut out for their jobs. The new Series Eight Pacemakers have, however, simply by a touch here and there added a marked improvement in appearance to their other estimable qualities. The name, Series Eight, incidentally, is derived from the fact that Department of Commerce approval has been obtained for them either as eight-place landplanes or as eight-place seaplanes. A six-place version, with some extra trimmings inside, is also available.

A glance at the performance specifications for the Series Eight bears out our remark that Bellanca airplanes are always efficient. With the 420 hp. Wright Whirlwind engine, and fitted as a cargo plane (on wheels), it shows a top speed of 170 m.p.h., a range of between 400 and 500 miles with a payload of 2,000 lb. As the seaplane the payload is reduced to 1,788 lb.







Land or water. The new Bellanca Series Eight Pacemaker as a seaplane (above) and as a standard land plane. A six-place version with extra trimmings, is also available for executive use.

General structural features of the new models follow well-known Bellanca lines. Fuselage is of welded steel tube, fabric covered, wings are of wood. The characteristic lift struts are of steel tube with metal ribs, fabric-covered. Wings and tail surfaces are fabric covered. Changes which have been made include the widening of the cabin, (the new cabins are 4 in. wider than any previous Pacemaker), the addition of a full NACA engine cowl, installation of a throw-over type wheel control, and a newly designed landing gear of the full cantilever type. The changeover from land to seaplane is relatively simple. The floats are standard Edo Model 6235 equipped with the regular water rudders. Both versions of the same machine appear in the accompanying drawings and photographs.

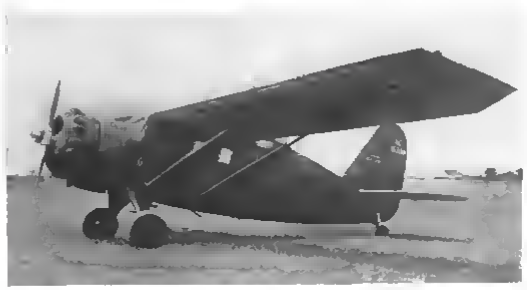
The first of the new Series Eight Pacemakers has been delivered to General Airways, Ltd. of Toronto, Canada, the fifth Pacemaker to enter General Airways' service. A six-place executive model has been ordered by Mr. R. R. M. Carpenter of the E. I. du Pont de Nemours & Co. of Wilmington, Del. It is scheduled for delivery on Sept. 15, and will be fitted up with complete two-way radio, night and blind flying instruments.

The general specifications for the Standard Eight Pacemaker are: Span, 50 ft. 6 in.; length overall, 27 ft. 11 in., height overall, 8 ft. 6 in., wing area (including ailerons), 311 sq ft., weight empty, 3,000 lb.; useful load, 2,600 lb.; gross weight, 5,600 lb. (As a seaplane cargo freighter, the weights are as follows, empty, 3,470 lb.; useful load, 2,430 lb.; gross weight, 5,900 lb.) Performance (as landplane): top speed, 170 m.p.h., cruising, 145 m.p.h. (75 per cent power at sea level), climb, 700 ft. per minute; range at cruising speed, 400 miles as cargo carrier, 1,180 miles as passenger carrier. As a seaplane performance is as follows: top speed, 150 m.p.h., cruising, 135 m.p.h. (75 per cent power at sea level); climb, 550 ft. per minute; range, 400 miles as cargo carrier, 950 as passenger carrier.

Of special interest among recent Bellanca deliveries is No. 811 DeLuxe Skyrocket for Dr. Richard U. Light of New Haven, Conn., who lately achieved fame by an airplane cruise around the world. This machine is fitted with a Wright Whirlwind of 420 hp. and is a standard Skyrocket model, except that it is fitted up with a number of special items. The rear seats, for example, are the new type Irvin Chute Chairs (see also page 40) which are built into the airplane. The ship is also fitted with two-way radio and a full complement of navigating instruments, including a Gatty drift indicator.

Some time ago (AVIATION, February, 1935) we described the latest in Bellanca Cargo Aircruisers, the first of which had just then been delivered to the Mackenzie Air Service of Canada for the Eldorado Mining Co. in Northern Alberta. The first ship proved so satisfactory that a second, mounted on Edo floats, has just been delivered. It is intended primarily for cargo carrying and has seats for only two, pilot and co-pilot. It has, however, a payload of 3,445 lb. and with its 697 hp. Series SGR-1820-F3 Wright Cyclone, can touch a top speed of 152 m.p.h. (at 7,400 ft.) Normal cruising speed (at 75 per cent rated hp. and 12,000 ft.) runs 145.6 m.p.h. Its range is from 610 to 1,000 miles. Hamilton-Standard three-bladed controllable pitch propeller is fitted. The ship is equipped with a pair of Model 12,500 Edo floats with water rudders. It was licensed to a gross weight of 11,700 lb. as a seaplane. Both this airplane and the Pacemaker seaplane mentioned above were recently test flown and approved by Department of Commerce inspectors at the plant of the Edo Aircraft Co., Port Washington, L. I.

Cyclone powered Cargo Aircruiser recently delivered to Mackenzie Air Services of Canada for use in the mining district of Northern Alberta. This machine is on Edo floats.



Wright powered Bellanca Skyrocket DeLuxe recently delivered to Dr. Richard U. Light of New Haven, Conn., for long distance cruising.

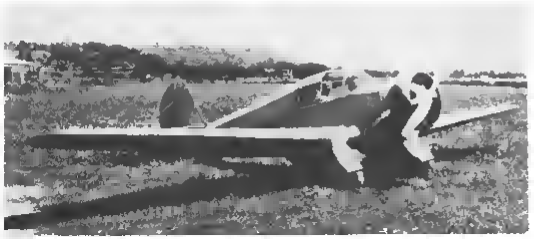
Aeronca's Latest

New machine differs radically from current models.

NOT as a substitution for the well-known C-3, but as an addition to the line of machines produced by Aeronautical Corporation of America, comes a low-wing, cabin monoplane for two. Mentioned briefly as having been a visitor to Detroit Aircraft Show last month, (AVIATION, August 1935) a few further details are now available.

Construction appears to be conventional. The fuselage and tail surfaces are of welded steel tubing, fabric covered. The wing is a full cantilever type, also fabric covered. Landing gear is built into the center section of the wing. Pilots sit side-by-side under a transparent cabin enclosure.

A number of alternate power plants are to be available. Standard models are fitted with the LeBlond 70 or the LeBlond 85. The machine may also be



The new Aeronca supplements does not replace the current C-3 model.

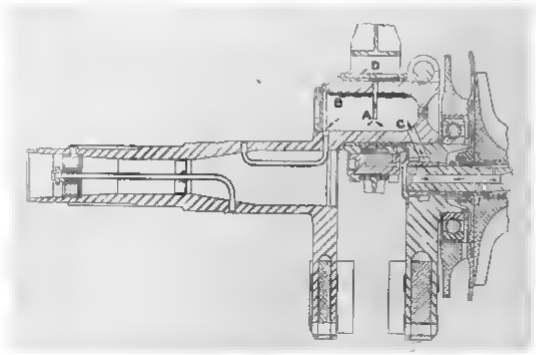
powered with a Warner Jr. of 90 hp or the Lambert 90 hp engine

Model	C-70	C-85
Engine	LeBlond 70	LeBlond 85
Span (ft. in.)	36-0	36-0
Length (ft. in.)	22-0	22-6
Wing area (sq. ft.)	150	150
Fuel capacity (gal.)	25	25
Oil capacity (gal.)	2	2
Gross weight (lb.)	1,500	1,500
Weight empty (lb.)	875	865
Pay load (lb.	700	500
Wing loading, (lb. per sq. ft.)	10.0	10.0
Power loading (lb. per hp.)	21.4	17.65
Top speed (m.p.h.)	115	120
Cruising speed (m.p.h.)	100	105
Landing speed (m. p. h.)	50	50
Climb first minute (ft.)	450	600
Service ceiling (ft.)	13,000	16,000

Sludge Separator

Centrifugal sludge separator now feature of Wright engine

It is well known that even the best of the conventional oil strainers and filters on aircraft engines can take out but a part of the foreign matter that circulates with lubricating oils. Only such particles of carbon or other material as are of sufficient size to be retained on the disks or screens are removed. Certain minute particles caused by oxidation of the oil are too small to be handled by strainers. To handle such matter the Wright Aeronautical Company has made a simple centrifugal sludge separator a part of the regular crank pin assembly of Whirlwind and Cyclone engines. Referring to the diagram, instead of allowing the oil to flow out of the hollow crankpin into the main bearing by the simple expedient of drilling a hole through the journal, a small tube or standpipe (A) is inserted which projects well into the hollow crankpin. When the engine is in operation, oil enters the crankpin under pressure. Centrifugal force acting on the oil trapped in the crankpin carries the heavier carbon particles and the products of oxidation against the wall of the chamber. Thus centrifugally cleaned oil is introduced through the tube through the master rod bearing. The separated particles collect in a cake on the inner surface of the bearing shell. At every overhaul this sludge cake is removed through a plug at the rear of the crankpin.



Cross section of Wright Cyclone crankshaft showing crankpin oil chamber and sediment separator. (A) separator tube, (B) sludge cake deposited on wall of oil chamber by centrifugal action, (C) oil inlet to crankpin, (D) master rod bearing

On a recent 400-hour endurance test on a Wright Whirlwind 285, under flight conditions, some 2 oz. of sludge was found to have been collected in the crankpin when it was disassembled. Oil had not been changed during the test, fresh oil having been added as required to make up for that used. Master rod bearings were in excellent condition with smooth and polished surfaces.

Mr. Farquahar's B17 Beechcraft on Edo floats

Beechcraft on Floats

Edo floats on round-the-world cruiser.

A B17 BEECHCRAFT under British registry attracted a good deal of attention at the recent Detroit Show. This ship, powered with a 420 hp. Wright Whirlwind engine, was fitted up with all sorts of extra equipment. Its owner, Mr Harold Farquahar of the British diplomatic service, with his pilot, Fritz Bieler, are about to start a round the-world cruise. Since part of the trip will necessarily be over long stretches of open water, the ship has been taken to the College Point plant of the Edo Aircraft Co. and fitted with a pair of Model 39-4000 floats with water rudders. Most interesting feature of the installation is that the regular wheel landing gear and the tail wheel were not removed from the ship, but were merely retracted and the floats installed. For part of the trip the owner plans to remove the float gear and to continue with the ship as a normal land plane.

Burnelli Transport

A twin-engined all-metal monoplane with characteristic Burnelli features

Few people have stuck to an idea that seemed to them inherantly good as has Vincent Burnelli with his airfoil fuselage. First machine, a biplane, took to the air in 1921, is now a cherished museum piece at the Burnelli Keyport factory. The latest machine differs from its 1921 prototype in that it is a monoplane, is powered with air-cooled radial engines, is built entirely of metal. It retains, however, the broad fuselage of airfoil section fore and aft.

The arrangement offers a number of interesting features relating particularly to pilot vision, pilot safety and the accessability of power plants while in flight. The cockpit, high on the leading edge between the engines, offers unobstructed vision forward, rearward and overhead. Lateral downview is obtained by large windows set in the underside of the leading edge of the fuselage on each side of the cockpit. It is also possible for pilots to look backward below the wings through the cabin windows. The position of the retracting under-carriage may be seen at all times.

It is argued that safety and strength are provided by the broad fuselage. Engines and landing gear both attach directly to primary structure. The power plants and their mountings also have considerable ability to absorb shock in the event of collision with the ground or other objects.

Another feature which aids control in the one-engine-dead condition, is the relatively close side-by-side mounting of the two engines. The turning moments introduced with only one engine operating are low and are easily compensated for by the vertical surfaces without reducing available directional control in any marked degree.

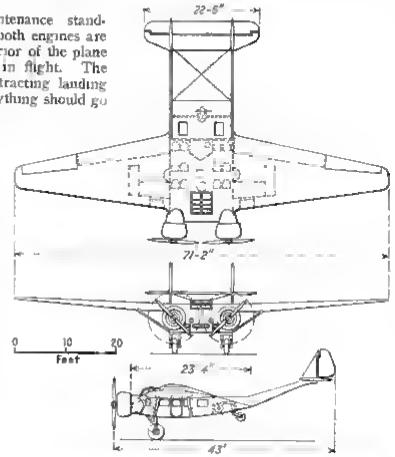
Again, from a maintenance standpoint, the rear ends of both engines are accessible from the interior of the plane for minor adjustments in flight. The same is true of the retracting landing gear mechanism. If anything should go wrong, it is possible to reach it for repair or adjustment.

Structural features of this ship were rather fully described in AVIATION for January, 1935. Aluminum alloys are used throughout, both for framing and covering of the wings, boom, tail surfaces and fuselage. Wings are highly tapered. Ailerons are dynamically balanced, are of the latest deep chord short-span type. Wing flaps are also provided for reduced landing speed. Wing flaps and the landing gear are operated hydraulically.

The large cabin provides space for fourteen passengers. It is claimed that the cabin space per passenger is much larger than for any conventional type airplane so far built. Large cabin space is important not only from a passenger comfort angle, but for the carriage of bulky freight and express pieces.

The ship is arranged to take any radial air-cooled engine of 700 to 725 hp. Controllable pitch propellers are normally fitted. Engines are housed in full NACA cowling.

The general characteristics of the airplane are: span, 71 ft.; length overall, 43 ft.; height overall, 10 ft.; total lifting area, 686 sq.ft.; weight empty, 8,000 lb.; payload, 3,200 lb.; gross weight, 14,000 lb.; wing loading, 20.4 lb. per sq.ft.; power loading, 9.65 lb. per hp. The performance as a land plane is as follows: top speed (sea level), 210 m.p.h. (10,000 ft.), 225 m.p.h.; cruising speed (sea-



The Burnelli UB-14 transport test flown recently at Keyport

level) 185 m.p.h., (10,000 ft.), 200 m.p.h.; top speed, one engine dead (7,000 ft.), 150 m.p.h.; landing speed (with flaps), 63 m.p.h.; rate of climb, 1,250 ft. per min., range at cruising speed, 600 mi.

The ship may also be rigged as a twin-float seaplane on Edo Model 37-15750 floats. As a seaplane its specifications are modified as follows: length overall, 46 ft. 8 in.; height overall, 18 ft. 8 in.; weight empty (including 1,800 lb. of floats and bracings), 9,110 lb., gross weight, 15,110 lb., wing loading, 22 lb. per sq.ft.; power loading 10.44 lb. per hr. Performance: maximum speed (sea level), 185 m.p.h., (at 10,000 ft.), 197 m.p.h.; cruising speed (sea level), 164 m.p.h., (10,000 ft.), 175 m.p.h.; landing (sea level), 65.5 m.p.h. also of note. The tail wheel is fully retracting.

The aerodynamic features of the ship appear to be more or less conventional. Wings are full cantilever, highly tapered, are provided with trailing edge flaps. Position of nacelles with respect to wing seem to be in accordance with latest NACA recommendations. Fin and stabilizer are built integral with the fuselage, with tabs provided for trimming. Fuselage lines are remarkably clean. Of interest are the protuberances here and there to surround the protecting machine gunners. Bomb load is completely housed in the fuselage. Evidently the bomb bay occupies the underpart of the center section, with covering hatches completely closed in flight. The transparent bird-cage forward is for the use of gunner and bomber.

Equipment includes the latest navigational and radio aids, two-way telephone, homing device and automatic pilot.

Boeing Bomber

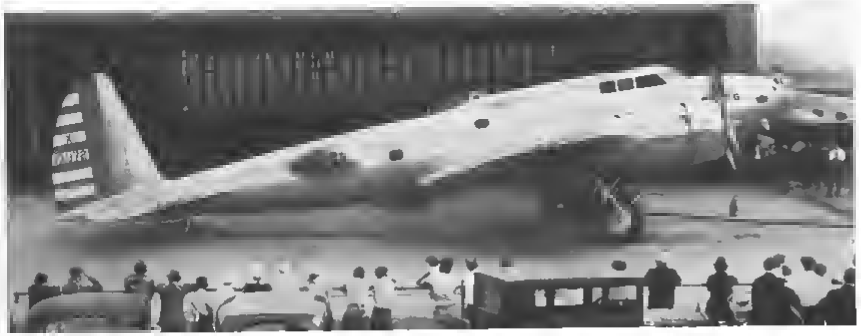
Boeing 299 flies to Dayton for bomber competition Aug. 22.

FOR OBVIOUS REASONS the complete story on the bombers now offered to the Air Corps by three of the outstanding manufacturers will not be available for some time. A new group of pictures has been received from Seattle, however, which will supplement the preliminary description of Boeing's candidate which was published in AVIATION for August. (See also page 50, this issue.)

Some idea of the size of the plane may be had by comparison with the figures of the men. Although detailed dimensions have not been released, it is known that the span is approximately 105 ft., the length overall some 70 ft. and the height on the ground over 15 ft. The gross weight is in the neighborhood of 15 tons. Power plants appear to be of the single row type, probably geared P & W Hornets which would mean a total of about 3,000 hp. available. Propellers are three-bladed Hamilton Standard controllables.

The landing gear treatment is interesting. The main wheels evidently come up into the inboard nacelles, swinging forward about the rear supporting points by a toggle action of the forward strut. The latter appear to be of a double forked type with a knee joint in the middle. The usage of a double shock strut on each side of each wheel, with

A few details of the 299 Boeing. Of particular interest is the arrangement of the retracting landing gear



Boeing's 299 bomber. The largest landplane in the United States is here shown being groomed for test flights at Seattle before presentation to the Army bomber competition on which bids were opened Aug. 22.

Navy Notes

A recent fighter, an observation and two scout planes show Navy trends

FROM official sources come photographs of some of the latest equipment in which the Navy is interested. Notable is the adherence to biplane types, and the obviously increasing usage of 14-cylinder twin row radial engines.

The Curtiss X03C-1 scout observation type is the prototype of SOC-1 of which 135 are now being built by the Curtiss Aeroplane and Motor Co. at Buffalo for the Bureau of Aeronautics. This order amounting to some $2,750,000 including spares, is one of the largest to be placed in this country for airplanes since the war of 1917-18. Of interest are: the single strut, fully streamlined landing gear, full enclosure for pilot and crew, short span, deep chord ailerons, slots and flaps fitted to the upper wing, trailing edge flaps for controlled engine cooling on the NACA cowl. Planes of this type are fitted with landing gear as shown for carrier operations, but floats may be substituted for catapulting from battleships and cruisers.

The fighter is the Douglas XFD1 presented recently for a two place fighter competition. It is single bay tapered wing biplane of conventional appearance. Of chief interest is the composite construction of the fuselage where the usual steel tubing (fabric and sheet metal covered) construction is combined with a monocoque tail section with integrally built fin and stabilizer. The glassed in cockpit covers are of somewhat unusual form.

Third on the list is a late Vought Corsair. The usual Corsair characteristics are apparent, including the so-called "vision" center section, side gasoline tanks, and cross axle under-carriage. The 14-cylinder twin Wasp engine is in evidence. Note also the streamlined housing beside the forward cockpit for emergency flotation gear.

Most recent Chance Vought, the first of an order for 84 Scout Bombers is the Model SBU-1. The Twin Wasp Jr. engine (700 hp.) is housed in a full NACA cowl with adjustable trailing edge flaps to control cooling. Also, a split flap on the lower wing improves the speed range.

Top to bottom:

Prototype of the SOC-1 the Curtiss XO3C-1, two-place scout observation type

Produced for a recent Navy competition the Douglas XFD 1 two-place fighter

A late Chance Vought observation type the XO5U-2 powered with a twin row Wasp engine

Latest Vought Scout Bomber, the SBU-1, also with twin row Wasp

With Foreign Builders

Military equipment still holds the center of the European stage but a good summer crop of other types is also in evidence

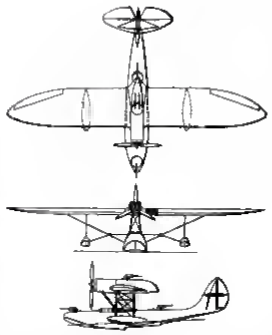
ENGLAND unveiled her latest in military equipment at the several Air Force displays in June and, except for a new trainer, and the first of a production series of patrol amphibians, has not since disclosed much that was new. The trainer is the Type 636 Avro with a reported top speed of 230 m.p.h. at 14,000 ft. For a two-place open cockpit, single bay biplane, it has unusually clean lines. Power plant is the 640 hp Siddeley Panther. It may be used as a two seater for training, or with rear cockpit covered, or as a single seater for advanced aerobatics and tactical training for fighter pilots. Equipment includes Vickers guns, and arrangements for prolonged inverted flying. The structure of the machine is steel throughout, welded steel tube in the fuselage, with wings and tail units built up of riveted steel strips on the Armstrong Whitworth system. The entire covering is fabric except around the nose. Undercarriage is of the single strut type, wire braced. It climbs to 15,000 ft. in 7.1 minutes, 20,000 ft. in 10.7 minutes. Service ceiling is 31,000 ft., absolute ceiling 32,000 ft. Landing speed is said to be 62 m.p.h.

The amphibian is a new model Supermarine Seagull, of which 24 are being built for the Royal Australian Air Force. For the British fleet, however, official designation is the Walrus. One machine is already in service on the Battleship Nelson. It is an all metal boat, powered with a single Bristol Pegasus engine mounted as a pusher. The machine is equipped for naval reconnaissance and fleet spotting duties in cooperation with carriers and cruisers.

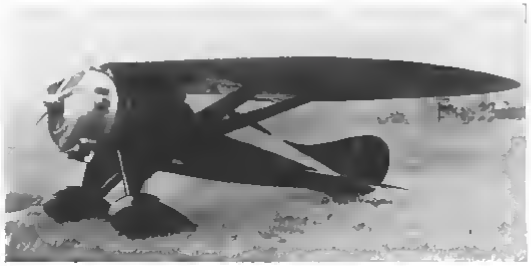
France has a couple of new marine types, first the Bernard 110 fighter, a mid-wing monoplane with circular fuselage, mounted on twin floats. Power plant is the Hispano-Suiza 9-cylinder V-8S of 710 hp. Top speed at about 8,000 ft. is said to be close to 220 m.p.h. Another recent French seagoing type is the patrol boat Loire 130, a single hull monoplane, water-stabilized by wing tip floats, powered with a Hispano-Suiza 12-cylinder Xbrs liquid cooled engine, (720 hp.) mounted as a pusher in an overhead nacelle. Top speed (at about 8,500 ft.) is 146 m.p.h.

A new machine in the heavy bomber class is the French Bloch 210, a low-wing two engined monoplane with well streamlined, fixed landing gear. Two Gnome-Rhone 14-Kbrs engines give it a top speed of better than 200 m.p.h. at some 12,000 ft. The range is said to be better than 1,200 miles with a bomb load of just over 4,000 lb.

Italy, on the verge of warfare in East Africa, undoubtedly has many more new types up her sleeve than she is willing to disclose. Reports have come in on two recent machines, however, the Vale, single-seat high wing monoplane pursuit, designed by Engineer Piero Magni of Genoa, and the CANT Z-501, long range flying boat which lately set a new world's record in a flight from Monfalcone, Italy to Berbera in British Somaliland some 3,080 miles. Contray to British and American flying boat practice, the CANT Z 501 is built entirely of wood. Power plant is a single 850 hp. Isotta-Fraschini Asso 750, geared and water cooled.



Champion long range flying boat—the CANT Z 501



The Italian Vale single seater for pursuit or civilian sports use. Fuselage is built chiefly of plywood, the wing is wood framed, fabric covered highly polished. Span is about 24 ft.; gross weight, 1,650 lb. With a 130 hp. Farina engine its top speed is 166 m.p.h.

Transport and Cargo Carriers

New transport machines seem to be in the minority lately. Outstanding among those described in last month's foreign press were the Wibault 670, a twin-engined low-wing transport for eighteen passengers with a total of some 1,600 hp. Engines are Gnome-Rhone air-cooled, mounted in leading edge nacelles. Under-carriage retracts under the nacelles.

Closely resembling the DH Comet, of MacRobertson Race fame, is Caudron's Model 640 powered with two 300 hp. Renaults. The arrangement is so similar to the British machine that it would be difficult to distinguish between the two ships in flight. The Caudron is designed especially for non-stop mail carrying across the South Atlantic.

Another of the recent transports is the Italian Savoia Marchetti S-79 monoplane powered with three Bristol engines. It is a low-wing, full cantilever type, of composite structure with welded steel tube fuselage, wooden wing. Combination slots and trailing flaps are fitted. Engines are housed in full NACA cowls. Capacity is eight passengers with a crew of three or four.

Sport types

Most important contributions in the sport-plane class is the Hornet Moth, successor to the well-known DH (open cockpit) Moth. This machine is a cabin biplane with side-by-side seating, with a Gypsy Major engine. It exhibits the highly tapered wing developed for the DH 86 and 89 transports. The structure is primarily of wood in the well-known DH manner.

De Haviland is also reported to have a new 4-5 place cabin biplane powered with two Gypsy Major engines (130 hp. each) grooming for the forthcoming King's Cup Race. Students of the

(Continued on page 40)

DeHavilland Technical School also are finishing up the TK-2, low-wing, two seat monoplane powered with a Gypsy Major for the race.

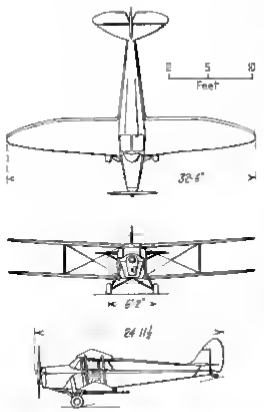
General Aircraft, Ltd. (England) has a new monospar, the Model ST-25 powered with two Pobjoy Niagaras. This low-wing cabin monoplane has the two engines mounted outboard in wing nacelles, a fixed landing gear. Interesting feature is the attempt to market this machine following automotive practice, selling it only with a full set of standard accessories including engine starter, dual controls, full navigation and landing lights, and radio equipment with homing device.

Encouraged probably by the success of Pou-de-Ciel, light plane building seems to be breaking out like a rash all over France. *Les Ailes* reports a number of such craft, including a motorized sailplane built by one E. Leroy, a parasol-type monoplane with a 30 hp auxiliary engine mounted over the center section as a pusher. Charles Fauriel has lately presented for test a low-wing cabin type monoplane for two powered with a 75 hp Pobjoy engine. This little machine is said to have a top speed of about 115 m.p.h., a ceiling close to 20,000 ft. A light biplane, "Le Moineau" of about 25 ft. span, weighing about 400 lb. empty and powered with a 35 hp engine was lately test flown near Paris by M. d'Hericourt.

Another light plane that has been attracting attention in France is the two-seater Gaucher Model R designed originally for 40 hp. engines but test flown satisfactorily on 26 hp. It is a high-winged, cantilever type with steel fuselage, wooden wings. Top speed is in the neighborhood of 60 m.p.h.

From Germany comes announcement of a new sport amphibian, the latest Dornier Libelle. This machine looks very much like the little flying boat that Grover Loening designed two or three years ago for use on board U.S. submarines. It is a full cantilevered monoplane with a single hull, wing tip floats. Power plant is a five-cylinder air cooled Gnome Rhone K5 engine of 240 hp. mounted in an overhead nacelle. It weighs 3,197 lb., all up. Top speed is 129 m.p.h.

Two new planes of the sporting type have appeared recently from Czechoslovakia and Poland respectively. The former, the Letov 9-329, is a parasol type tandem two-seater with open cockpits. It is powered with a Walter Minor, inverted four cylinder air-cooled engine. Of interest particularly is the use of fixed Handley Page slots on each wing tip. The Polish machine is a three-place high-wing cabin type somewhat similar in appearance to our own Fairchild 24. The RWD 13 is also fitted with a Walter Major four-cylinder inverted engine. It is of composite construction with wooden wings, steel tube fuselage. Top speed is 130 m.p.h.



Successor to the DH Moth, the DH Hornet Moth with Gypsy Major engine

Rear view of Dr. Light's Bellanca showing the built-in Irving air chutes

Chair Chutes

Custom-built parachutes are offered by Irving

A YEAR or so ago Irving Air Chute of Buffalo announced improvements in equipment involving the building of the chute into the upholstery of an airplane chair. Changes were also made in the harness so that webbing is not only entirely concealed when not in use, but is also completely adaptable for the use of either men or women in ordinary street costume. Improvements have since been made, and it is now possible to build chutes into the airplane cabin without any sacrifice in comfort or appearance. Good example of what can be done is in the Bellanca Skyrocket (page 31) recently delivered to Dr. Richard U. Light of New Haven, Conn. All four seats in this airplane are Irving equipped. A view of the rear of the cabin is shown in the photograph.

The Maintenance Notebook

Maintaining Soundproofing

ONCE an airplane is put in service it must not be assumed that soundproofing features may be neglected. Through the courtesy of Dr. C. A. Frische of the Sperry Gyroscope Company we are able to present a few notes on the servicing of soundproofing in Douglas transports.

Proper maintenance is quite important if the full benefits of the soundproofed cabin of the DC-2 are to be obtained. If various metal parts and fittings in the cabin are not kept in good repair, rattles and other noises which are very annoying to passengers will develop. Before the day of soundproofed cabins, these noises were submerged in the general din.

Investigations made by engineers of the Sperry Gyroscope Company, Inc., indicate that such items as safety belt clasps, reclining levers on seats, and ash trays are the worst offenders. Passengers quite often only pull ash trays out half way, and in this position they will rattle.

The bearings in the baffle plates in the heating and ventilating system should be inspected periodically and replaced if the clearance exceeds .005 in. Graphite lubricant should be used. Outlet shields of the ventilating system should be kept tight. Fire extinguishers, floor moulding strips, and various conduits and ducts may cause annoyances at times.

The felt strips through which the floor is attached should be checked occasionally and, if deteriorated to such an extent as to allow the floor to rattle, they should be replaced. The rubber door gaskets should be kept in good repair so that closure may be tight. They should be replaced every four or five months.

Considerable responsibility for proper soundproofing maintenance falls on the already overworked pilots or co-pilots. It is up to them to take note of any rattles and report them to service crews, who otherwise have no opportunity to know where the rattles are. It might also be mentioned that pilots should, under no circumstances, leave the cockpit door open. The cockpit is only semi-soundproofed, and leaving the door open upsets the acoustical properties of the cabin.

$13 Test Stand

ONE of the advantages of being located on an airport where surplus airline equipment is for sale is that there are many small parts that can be bought cheaply and built up into useful pieces of service equipment. The engine test stand built by James Borten, of General Airmotive Co., Cleveland, and illustrated elsewhere on this page, is an example. The total cost including tanks and instruments was $13.

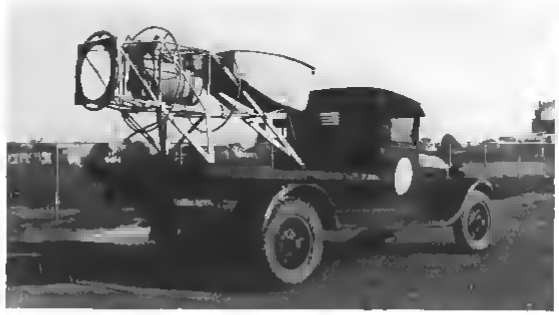
An old Fokker trimotor nacelle and the necessary instruments were bought from American Airlines. By inverting the nacelle unit and providing fittings on a 1-ton Ford truck (which was picked up second-hand for $75), a useful detachable unit was devised. Gasoline and oil tanks are also Fokker parts. An adaptor plate makes possible the mounting of any type of radial engine.

Quick-Servicing at Columbus

THE realization that a few minutes lost on the ground at intermediate stopping points may seriously disrupt flight schedules is reflected in the development of such equipment as the combination servicing stand designed by C. F. DeVoe, TWA's field manager at Port Columbus. In the ten minutes that TWA Douglases are on the ground at Columbus they must be refueled, propellers lubricated and a dozen items inspected. Portable stepladders on rubber-tired wheels are not particularly new, but by building one around a high pressure lubricator and installing a few other necessary gadgets (such as electric power cords, trouble lamps, etc.), the usefulness of the platform has been increased.

The unit is arranged to be towed behind a gasoline truck. As the truck is driven across the apron to the waiting airplane, an electric cable connected to main power outlet unreels behind it.

The lubricator is a Model HR-32 built by Alemite (Division of the Stewart-Warner Corporation). It is fitted with 20 ft. of rubber hose with a special push-type nozzle arranged especially for filling Hamilton Standard controllable pitch propellers with lubricant (summer, SAE-



For $85.00 (including the truck) James Borten made a very serviceable portable engine test stand for his shop.

This combination unit helps cut ground time at TWA's Port Columbus stop

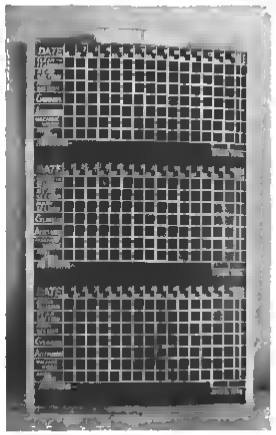
250; winter, castor oil). Back pressure automatically shuts off the flow when the bearing is full. The hollow tubing of the platform support is used to return excess oil from the nozzle to the tank. After each lubrication the nozzle is placed in the open end of the tube at the top of the carriage and the drip drains back into the tank. The tank is fitted with a heating element to maintain proper viscosity.

Engine Overhaul Board

NATIONAL AIRWAYS at Boston makes use of a simple engine overhaul time control board which should appeal to the small shop owner who has only a limited number of engines in overhaul at any one time. A glance at the board reveals the status of the work on each engine. At the end of each day, the crews who are at work on engines must account for their time by entering the record on the board and initialing it. Inasmuch as fifteen days is considered sufficient for any engine to be in the shop, fifteen squares are provided for each operation. Each square is divided into two parts diagonally. Mechanics enter the working time above the diagonal and initials below. At the end of each job it is a very simple matter for the foreman to compute the rates for each man for cost purposes as well as to get the total time put on the engine during overhaul.

Novel Run-In Stand

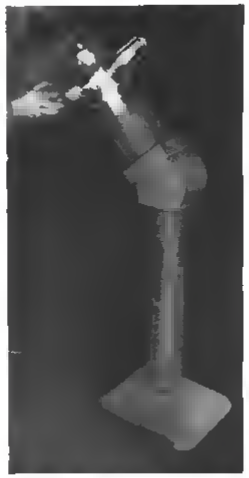
AIRLINE operators contemplating new installations for their engine run-in may find a useful idea in a test stand recently put into operation by the Bristol Company in England. Special feature is the mounting of the entire engine assembly on trunnions so that the engine may be tilted either upward or downward to simulate climbing or diving conditions. Beside the usual engine controls in the test house, there is also a control for tilting the stand to any desired angle. In this case the stand may be tilted through 180 deg. from vertically downward to vertically upward. This is probably necessary for manufacturer's test stands, but for ordinary commercial test work the range of angular adjustment could be considerably reduced.



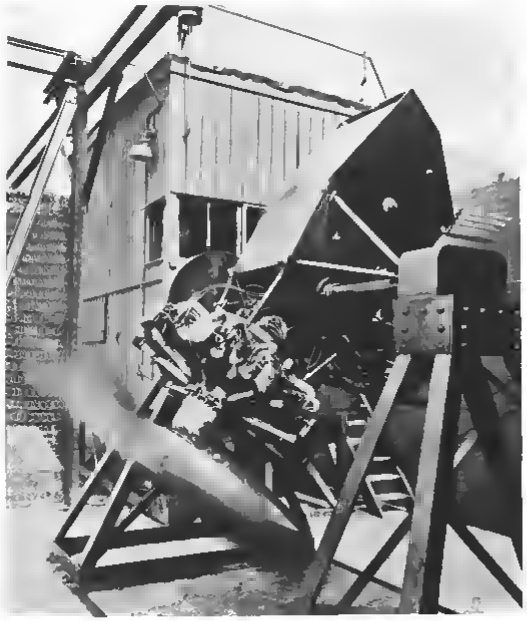
Engine overhaul time control board used by National Airways, Inc.

Propeller Hub Stand

FOR making adjustment and final assemblies on Hamilton-Standard controllable propeller hubs at United's shop at Cheyenne, an adjustable work stand has been developed which saves considerable time and effort. As seen in an accompanying picture, the stand is simple in construction, consists of a heavy cast iron base with a swiveling top, which may be turned to any convenient angle or direction. A mandrel on the top is machined up to give a good sliding fit for standard propeller hubs. The hub assembly is held at convenient height for any operation.



Simple and convenient jig for work on controllable propeller hubs at United's Cheyenne shop



Engine test stand which makes it possible to simulate diving or climbing conditions during run-in

Operator's Corner

An exchange of ideas on the problems of the commercial aviation industry

QUESTION 8: What is your method of paying pilots for dual instruction other services? Do you employ them on a straight salary basis or is there a salary plus hourly or mileage fee arrangement? Have you found it possible to retain your piloting staff the year around or is it necessary to reduce it during the winter? (Submitted by N. V. Nationale Luchtvaart School, Waalhaven, Rotterdam, Netherlands.)

No winter layoff

WE pay our pilots on a straight monthly basis. The same personnel, two instructors (in addition to myself), a mechanic and a stenographer, are kept the year around. Business falls off slightly during the winter but we manage to find enough to do to keep us busy.—JOE PLOSSER, *President, Grand Central Flying School, Glendale, Calif.*

Airline View

OUR pilots are employed or paid on the basis provided in the Wagner Labor Bill; that is, we pay the base pay plus the mileage and terrain variables and their record for determining base pay includes their former service with Northwest Airways as well as with Northwest Airlines. Dual instruction would be paid for on a basis of $5 per hour by reserve pilots. We have always been able to retain our pilot personnel throughout the winter months, but based upon our present operations it is very likely we will have to consolidate some of our present runs and thereby effect a reduction in our pilot personnel by fall.—F. W. WHITTEMORE, *Vice President, Northwest Airlines, Inc., St. Paul, Minn.*

Two Methods of Payment

OUR method is to pay regular pilots a straight salary, while extra pilots are paid by the hour. We find it necessary to reduce our staff during the winter.—H. C. ROBBINS, *The H. C. Robbins Company, Cleveland, Ohio.*

Straight Monthly Salary

WE have always paid our pilots a straight monthly salary. We find that this is a much more satisfactory method than an hourly or percentage basis. It gives the pilot a uniform salary, and while he probably earns more than the amount of his salary in the summer, it is usually more than made up for during the winter months. We find, also, that the pilot is more willing to help out with other work when he is not in the air.—L. U. EVERLY, *President, Everly Aircraft Corporation, Salem, Ore.*

Increase Staff in Winter

WE have always employed our pilots on a straight monthly basis, with the exception of one pilot who works odd hours during the busiest part of the school year. He receives a minimum rate plus so much per hour. Contrary to most operators in this vicinity we find it necessary to increase our piloting staff during the winter. At that time of the year Stanford University students use every bit of good weather to get in their flying and we have to be prepared to meet their demands. Our most quiet student period is during the summer when we devote most of our activities to our Approved Repair Shop.—J. F. DONOVAN, *Manager, Associated Services, Ltd., Palo Alto, Cal.*

Pilots must be versatile

OUR method of paying pilots is purely a straight salary basis with no extras. We maintain our staff of pilots the year around, and during the winter we put them on other work, such as working up sales and rebuilding aircraft. We see no reason why a pilot should not be capable of doing something besides flying an airplane, and if he has not sufficient initiative and ambition to be useful in other ways, then we do not want him at all.—MALCOLM L. HATHAWAY, *President, Tred Avon Flying Service, Inc., Easton, Md.*

Salary plus commission

AT present our pilots are on a straight salary for all types of flying with the possibility of further earnings on a percentage of the gross flying receipts after they exceed a certain amount. It is not necessary to reduce the piloting staff here during the winter for on the Pacific Coast we find that our flying during the winter months is practically equal to that of the summer.—J. GRANT MCDONALD, *Dycer Flying Service, Dycer Airport, Los Angeles, Calif.*

No Problem

SINCE I do all my own piloting, I have no compensation problem.—BEN TORREY, *Corning, Calif.*

Question 10

Answers will be published in October

HOW do you compute operating costs of the various types of aircraft used by flying school operators? What cost factors do you use? On what basis do you compute depreciation of equipment? (Submitted by Edward A. Dycer, Manager, Dycer Flying Service, Los Angeles, Calif.)

Question 11

Answers will be published in November

DO you find much interest in college student flying in your community? What proportion of the students in school or college may be expected to be prospects for flight instruction? Have you made any attempt to sell the local educational institutions or their student bodies on the benefits of collective or individual flight instruction? If so, what were the results? (Submitted by J. F. Donovan, Manager, Associated Air Services, Ltd., Palo Alto, Calif.)

★

QUESTION 9: How have you solved the ground transportation problem in your operation? Have you made arrangements for special rates with bus or taxi companies, or do you provide service with cars of your own? Is the transportation between airport and city included in charges for charter service or is it collected separately? Do you charge students without cars for transportation to and from the field, or is the expense absorbed in some other way?

Lend cars to pilots

OUR airport is 3 miles from town, and we are always glad to lend visiting pilots an automobile. If they have any great distance to go, we call a taxi for them. To charter passengers we give free transportation to and from the field, as is the case with students.—MALCOLM L. HATHAWAY, *President, Tred Avon Flying Service, Inc., Easton, Md.*

Included

TRANSPORTATION charge between airport and city is included in the charter charge. As to students, we do not teach students unless they purchase planes.—H. C. ROBBINS, *The H. C. Robbins Company, Cleveland, Ohio.*

News of the Month

★ ***Army and Navy*** . . . **Wright Field begins tests on three new bombers . . . Air Corps competitions, bids, contracts . . . President signs Wilcox bill permitting Army to locate and acquire new bases . . . Executive order prohibits flying over arsenals and closes Western Aleutians . . . General Fechet is voluntarily retired after long service.**

★ ***Transport*** . . . **Roosevelt signs air mail act . . . July passenger traffic exceeds June record . . . New Stinson liners for Central and Delta . . . New schedules for Braniff and United . . . Delta has first fatal accident in new half year.**

★ ***Records*** . . . **Solberg reaches Norway by easy stages over northern route . . . Russian transpolar flight to San Francisco turns back.**

★ ***Lighter-than-Air*** . . . **Navy observes ZMC-2 birthday . . . will send entry to International balloon races . . . Swanson to investigate DeForrest charges Macon crash fault of Navy.**

★ ***Industrial*** . . . **Consolidated moves into new factory . . . Allison and North American order new quarters . . . Fairchild expands Long Island plant . . . Lockheed and Beechcraft orders . . . Vidal forecasts license classes based on comparative safety.**

★ ***Financial*** . . . **Boeing Airplane and Curtiss-Wright report losses . . . United Aircraft, Wright, Lockheed, gain during first half year . . . United Airlines make profit in second quarter . . . British aircraft stock movements.**

★ ***Foreign*** . . . **British appropriate $25,000,000 for expansion program . . . London defenses tested . . . Italy increases flying personnel.**

★ ***Airports*** . . . **Post Office rules out transfer of New York terminus from Newark to Floyd Bennett.**

Another Million a Year

Airlines get new mail rates. Passenger traffic continues to break all records

On Aug. 14 the President signed the Mead-McKellar Air Mail Bill substantially in the form reported in AVIATION for August, although a last minute return to conference was required to clarify the off route service provisions.

Most important immediate effect—for it otherwise "freezes" the air mail system in close to its present form—will be the revision of rates to levels recommended last winter by the I C C. In total that will mean approximately $1,100,000 a year more from air mail carriage than at present, and, since the new rates are retroactive to March 1, a "bonus" for past performance of about a half million to be pro-rated among the carriers.

Indications are that passenger mileage has not yet reached its summer maximum. Official figures for June were 31,225,699, bringing the half year's total to 139,400,000 compared with 75,300,000 in the first six months of 1934. American Airlines reports 19,498 passengers carried in July compared with 17,297 in June. United, a total of 20,341 against June traffic of 18,557. Other lines reported at least equal increases. July figures should therefore total between 34,000,000 and 35,000,000 passenger-miles.

The Bureau of Air Commerce reported progress on the installation of its blind approach devices. The equipment at Newark is already installed. That at Hoover Airport, Washington, is nearing completion. At Atlanta, Buffalo, Cheyenne, Indianapolis, Los Angeles (Municipal Airport), and St. Louis sites have been leased. At a number of other cities, negotiations toward leases are well under way.

The installation in its final form consists of two radio transmitting stations, one 2 miles, the other 1,500 ft. from the airport and in line with its principal runway, together with a number of lights on the ground leading to the field's edge. A chain of lights mounted in the runway flush with its surface completes the equipment, but must in each case be furnished by the municipality owning the airport.

Braniff Airways, with its seventh Electra on hand, inaugurated Aug. 1, an exclusive Electra service between Chicago and Kansas City and extended the "Chicago Limited" route to Houston, Texas. Its morning flight to Chicago now connects with United schedules for Cleveland and American schedules into Detroit.

Central Airlines had four Stinson A trimotors in service early in August, expected to add a fifth before the end of the month. With them they now operate three-hour schedules between Detroit and Washington, slightly slower schedules between Washington and Detroit.

Chicago and Southern report that new low fares in effect in July resulted in a 98 per cent increase in passengers carried over June. Passenger revenue increased 65 per cent.

Delta Airlines has also added several Stinson A's to its fleet, and has inaugurated a new night run between Dallas and Atlanta.

United, with forty 247-D's in service, was planning new schedules for Sept. 1 to slash an hour from its present seventeen-hour transcontinental running time.

Newark Port Victor

Post office decides rivalry for New York terminal

On Aug. 24, Harlee Branch, second Assistant Postmaster General handed down a final decision in New York's airport battle of the century. Only Los Angeles, Chicago and Washington now remain with first-magnitude airport warfare on their hands.

Almost before he took office, New York's Mayor La Guardia, who served with American airmen in Italy during the War, started a campaign to get the Post Office to move its official New York terminal from Newark to Floyd Bennett Field on Long Island. To the already huge investment in the Brooklyn field he added substantial relief fund projects. He lined up New York Congressmen. He persuaded TWA to sign up for the move, provided Post Office approval could be secured. He got headlines for his fight by insisting

TWA fly him to Floyd Bennett on a ticket reading "New York." He formed committees

Few claim that Newark is Floyd Bennett's physical equal in hangars, field size, or general appearance But the Post Office has decided the move would cost $30,000 to $40,000 to make and that expenses would run $115,000 to $125,000 a year higher thereafter Then too, rail facilities at Newark permit the prompt forwarding of mails when flights are cancelled Floyd Bennett has no such connections The mail, Mr Branch has ruled, will stay in Newark

Order, Order

The Air Corps starts tests on three bombers. Contracts, bids, competition under recent appropriations

THREE new bombers turned up at Wright Field for a bid opening Aug 22 and served notice that the drift in aerial warfare toward the swift, heavily armed "battle cruiser" had become a tide

The Corps will withhold design details for at least a year, but preliminary tests at factories and delivery flight forced the release of general features All three are all-metal mid-wing monoplaos. All have retractable landing gears, latest cowling and propellers, some sort of wing flap mechanism The lowest speed estimate on any of them is 225 m p h

Douglas sent one of them. With two engines, probably the latest Wright Cyclones, it is thought to be basically similar to the DST (Douglas Sleeper Transport) soon to appear but larger and with its wing in a higher position

Another came from Martin's factory in Baltimore Two Wright Cyclones, geared, and supercharged to deliver over 800 hp each form the power plant Span is 76 ft, 6 ft more than the wing on the Martin B-10, and a new high lift device raises the take-off capacity, lowers landing speed Otherwise the new ship strikingly resembles the smaller Martins

The third, the Boeing 299, has started all the headline writers in the country off on "dreadnaught of the air," "flying fortress," "death dealing battle cruiser of the skys" and so on It mounts four of the latest Pratt and Whitney Hornets Its fuselage is studded with machine gun "blisters" in the nose, roof, sides, and belly It has a span of 105 ft a length of over 70 ft It lifts a gross weight of 15 tons. (See also page 34)

Leslie Tower, chief Boeing test pilot, flew it into Dayton from Seattle at an average speed of 233 m p h at 63 per cent throttle and at an average altitude of 10,000 ft, which (with no great tail wind) would indicate a full-out top speed of about 250 Its designers have beefed the engine mounts to take 1000 hp motors when, as, and if such things become available. Eight hundred more horsepower would probably boost its speed to nearly 275 m p h

Under the Air Corps' present procurement system, the decision between the three rival designs may take months. Formerly Army aircraft procurement policy varied from contract to contract Now a uniform practice calls for bids well in advance of the opening date and sets complete specifications for the ships desired (Bids on these bombers, for example were issued in July 1934) Anyone may submit a bid, but each bid must be accompanied with a completed ship ready for testing A board is then appointed for each competition. G H Q officers, advanced test pilots are put on it, as well as Wright field technicians. The board goes over the plane with a fine tooth comb, awards up to 650 points of merit for design features such as structure, engine mounting, visibility, etc. Then exhaustive flight tests begin Each plane is given so many points for meeting each minimum performance requirement, so many extra for exceeding that minimum by various amounts A total of 350 points may be given in these performance tests. Finally the board's report goes to the office of the Chief of Air Corps where the merit and cost of each design are weighed together Only then can a contract be expected

Estimates of manufacturers investments in the three bombers run at $350,000 each for the Douglas and Martin, a minimum of $500,000 for the Boeing But the play is for high stakes, for the Air Corps has $23,825,000 to spend on new aircraft this fiscal year, and its program calls for 118 bombers.

Prices quoted by the three manufacturers for the airplanes in the Army bombing competition were released by Air Corps officials during the early stages of the test period The figures given out by Col H. A. Strauss, Air Corps materiel procurement chief at Wright Field, follow

	Lots of 25 ships	Lots of 220 ships
Boeing	$116,730	$59,820
Douglas	95,150	58,500
Martin	95,510	48,880

The prices quoted above do not include engines.

Air Corps Invitation for Bids, 1936 Funds

Type	A C Spec. No.	Quantity	Bid Opening Date
Cargo Transport	98-1771	20-100	5-24-35
Two-place Pursuit	98-601	25-200	5-27-35
Observation	98-400	10-50	8-28-35
Attack	98-100	25-160	8-24-35
One-place Pursuit	98-608-A	25-200	8- 9-35
Bombardment	98-201	25-220	8-22-35

Air Corps Invitations for Design Competition

	AC Spec No	Date
Bombardment	X-202	4-15-35
Observation	X-403	4-25-35
Two-place Pursuit	X-802	4-25-35
One-place Pursuit	X-403	5- 6-35

Recent Contract Awards—1935 and 1936 A. C. Funds

Year	Type	Number	Contractor	Amount
1935	Attack	110	Northrop Corporation	$1,890,400
"	Training	30	Sevorsky Aircraft Corp	754,738
"	Bombardment	103	Glenn L. Martin Co	3,195,450
"	Observation	71	Douglas Aircraft Co.	1,655,394
"	Two-place Pursuit	50	Consolidated Aircraft Corp	1,996,700
1936	Training	42	North American Aviation	559,731
"	Training	26	Stearman Aircraft Corp	

Defense Bases

President signs Wilcox bill and prohibits flying over Aleutians

THE PRESIDENT has signed the Wilcox bill, passed late in March by Congress By its terms the Air Corps is given authority to locate, acquire, and develop air bases of strategic importance in national defense Specifically it recommends location of a base in each of the following regions (1) The North Atlantic states—to provide for training in cold weather and fog (2) The Atlantic Southeast and Caribbean areas—to permit training in operations in defense of the Panama Canal (3) The Southeastern states—to provide another G-H-Q depot (4) The Pacific Northwest—to establish air communications with Alaska (5) Alaska—for training under arctic conditions (6) The Rocky Mountain area—for training in operations from high altitude fields It further suggested surveys of "such intermediate fields as may be necessary in transcontinental movements"

While it carried no appropriation of funds, and although President Roosevelt has indicated no large allotments of relief funds for the projects, the Air

Corps hails the act as second in importance in recent history only to the organization of the G H Q air force It looks forward confidently to getting necessary appropriations from future congresses

To begin the work a special committee has been appointed It consists of Cols John D Reardan and Lt Col Joseph T McNarney of the Air Corps and Lt Col John P Smith and J B Brooks and Major W F Tompkins of the General Staff

The President also issued an order under the Air Commerce Act prohibiting flying over a long list of Army and Navy arsenals and reservations Of little direct importance in most cases, because such bases have long been distinctively marked as a warning to flyers, the inclusion of the Western Aleutian Islands lying off the Alaskan Coast caused considerable comment Many think it points toward the location of naval and air bases there in the near future

Final item of news relating to bases was the inclusion in the Long-killed Third Deficiency Bill, of an appropriation of $1,124,000 for new buildings at the Fleet Air Base at Pear Harbor, Hawaii

Foulois Retires

Air Corps head quit voluntarily. Westover to be Acting Chief.

EARLY last month Major General Benjamin D Foulois asked for and was granted retirement from active army service His four-year term of duty as Chief of Air Corps had been due to expire Dec 22. Target during the past year of continued attacks by the House Military Affairs Committee, General Foulois had been recently cleared on numerous congressional charges by the Army's Inspector General, but reprimanded for "making exaggerated, unfair and misleading statements to a Congressional committee"

Few army men have played as important a part in the development of any branch of service, as Foulois did for the flying arm In 1908 he became its first dirigible pilot, in 1909 its first qualified flyer of heavier-than-air craft. He headed the air forces, attached to the Mexican punitive expedition in 1916, and for the first few months after its arrival in France, headed the Air Service of the A.E.F In 1927 he became Assistant Chief of the Air Service; Chief in 1931

To the post of Acting Chief Secretary, Dern has appointed Brigadier General Oscar Westover, a qualified pilot of both lighter and heavier-than-air craft He has been in the Air Service since 1919, has served as Assistant Chief in the Washington office since 1931

Pacific Progress

Pan American's Asiatic project nears completion

THREE important milestones were passed last month on the way toward scheduled service to the Orient

The North Haven Pan American supply ship returned to San Francisco It had started out last spring loaded with two complete villages, four air bases and supplies for months of scheduled operations of the 8,000-mile airline Bases are now ready at Hawaii, Midway, Wake, and Guam Manila facilities are still waiting settlement of Philippine policy on the project, but seem assured by the time they will be needed

The Sikorsky Clipper completed another demonstration-test flight, this time to Wake Island, third base in the chain Capt R O D Sullivan, who had served as second in command on the two previous flights, commanded John Tilton served as second in command Max C Weber as junior officer Neither of them had been on earlier trips The flight was splendidly dull from a news point of view, repeating in every detail the precision and efficiency of the first two

Aug 12 Postmaster General Farley called for bids returnable Oct 21, on an air mail service from San Francisco to Canton via Honolulu and Manila The specifications are packed with interest. Initial frequency is to be once a week each way Basic mail load 800 lb with provision for extra poundage if offered. The service must be performed in safe and suitable aircraft of the multi-motored seaplane type capable of sustaining flight on 50 per cent of power They must have a minimum cruising speed of 125 m p h, provide at least six passenger seats, be able to carry fuel for the various stages against a 30 mile an hour head wind and have an hour's fuel in reserve

The contract will run normally for ten years but may be revised after four by the Postmaster General after a proper hearing It must be approved by the Secretaries of War, Navy and State and the Attorney General It must lie within the limits of $2 a mile with $1 allowance per thousand pounds of extra load as specified by the Foreign Air Mail act Contractors and crews must be American, equipment, of American manufacture

The contractor must make arrangements at his own expense in obtaining concessions to operate, for landing facilities, light houses, radio and other aids to navigation

Coast Conferences

Western airport and fixed base operators gather at three A. C. of C. Conferences

APPROACHING the close of a national circuit of regional conferences for airport managers and fixed base operators Fowler W Barker of the Aeronautical Chamber of Commerce, staged three meetings last month on the Pacific

WELL HOUSED

squadrons from aircraft carriers huddle in the airship hangar at Moffett Field Seventy two fighting planes have based there for extensive coastal maneuvers during the summer.

Coast. Dates and places: Portland, Aug 6, San Francisco, Aug 8; Los Angeles, Aug 12. Aggregate attendance about 100.

At Portland, Major Howard French, of the Oregon State Board of Aeronautics, was chairman, and William Randall, of Klamath Falls, a leading contributor. San Francisco's St Francis Hotel was the scene of the meeting there. Bernard Michael Doolin, Municipal Airport manager and S.E.R.A. and W.P.A. airport director, presided. Chairman for the fixed base session was Roy St John, manager, San Francisco Bay Airport. The Los Angeles meeting was held at the Hollywood Plaza Hotel with Frank Denslow, president Union Air Terminal, chairman for airport and fixed base sessions, and Palmer Nichols, president, Pacific Airmotive Corp., for the repair station meeting.

Invitations to each conference were extended to operators' throughout the country and a number of those present came from points beyond the immediate regions of the conferences. Some attended two or more meetings. Among these were Vern G. Halliday, manager of Salt Lake Municipal Airport and special representative of the Governor of Utah; Miss Layda Kalishek, manager of Clover Field, and Leslie E. Neville for AVIATION.

Remaining conferences in the southern sector include Birmingham, Ala., Oct. 4, 5.

Lighter-than-air

Minor developments indicate continued activity

As MAJOR airship activities last month awaited the launching of Germany's new zeppelin—scheduled for this fall—and the finding of the Science Advisory Board's committee on the airship program, these items appeared in the News of the Month.

M.I.T. Professor, A. V. De Forest, member of the above mentioned committee, charged that the Macon would not have crashed if repairs recommended prior to the tragedy, had been carried out by the Navy. Secretary Swanson ordered an inquiry into those charges. Said he would appoint a committee to conduct it.

The Navy observed the sixth birthday of the ZMC-2, small metal clad dirigible, at Lakehurst, and began a program of improvements at that station with relief funds.

Goodyear Zeppelin demonstrated a new portable mooring mast for non-rigids at Akron.

The National Aeronautic Association announced that the Navy had accepted its invitation to enter a balloon and crew in the International Balloon Race at Warsaw, Poland, Sept. 15. Since no National Elimination race had been held this year it had also invited the Army, George Hineman of Cleveland, and Karl Lange of Goodyear-Zeppelin to enter. Only the Navy accepted. They will be represented by Lts. R. F. Tyler and H. T. Orville.

British Expansion

Parliament votes $25,000,000 for Air Force

LATE in July the House of Commons passed the largest appropriation for Air Force expansion since the World War. The total sum was £5,335,000. For technical and warlike stores (new aircraft) £3,150,000; works buildings and lands, £947,500; pay and allowances, £455,000. In the explanatory memorandum which accompanied the estimates when submitted, the program which these funds will inaugurate calls for 71 new combat squadrons by 1937, and for adequate reserves, training planes, etc., to accompany them. It will entail the increase of personnel by 2,500 pilots and 20,000 others during the next two years. It aims at an ultimate 1,500 effective first line planes, exclusive of overseas and naval squadrons. The bulk of the cost will fall in 1936.

As though to throw one more scare into a populace already thoroughly alarmed about its air defenses, mock air raids against London last month showed up a serious inadequacy in its anti-aircraft searchlight defenses. Theoretically, 21 bombers scored hit after hit against dockyards, barricks, and important factories while defense squadrons waited at airports and anti-aircraft batteries stood silent because the searchlights could not pick out the attackers at any great altitude nor hold them in their beams once they had located them.

Italy Prepares

Mussolini calls air reserves for war service

IN the face of immediate war in Ethiopia, Il Duce last month summoned 500 more officers, 1,800 non-commissioned officers, and 10,968 men to the air service. He also decreed that 1,500 officers, and 1,500 non-commissioned officers now in the air force reserve should be maintained on active duty. Before these increases Italian air force

Aviation in Congress

Number of Bill	Introduced by	Purpose
	BILLS FINALLY ENACTED	
HR.9806	Smith (Va.)	To create a commercial airport for the District of Columbia. Considerably simplified from its original form, now calls merely for appointment of a commission of seven to investigate and recommend upon a Washington airport site.
HR.5153	Dimond (Alaska)	To provide for enlarged air mail service in Alaska at the discretion of the Postmaster General.
HR.7023	Wilcox (Fla.)	The Wilcox or Air Frontier Defense Association Bill to authorize the development of new Army Air Corps stations. Annual expenditure under the new provision limited to $24,000.
HR.8822	Lee (Okla.)	To effect purchase of the Winnie Mae from Wiley Post for the Smithsonian Institution for $25,000. Passed by both houses on the day of Post's death.
HR.8788	Foreign Relations Committee	To declare the neutrality of the United States in all foreign hostilities and to maintain it by prohibiting any exports of arms or munitions. To what extent if at all aircraft and parts thereof are to be classed as armaments and munitions is unexplained.
	BILLS FAVORABLY REPORTED OUT OF COMMITTEE	
S.3208	Costigan (Colo.) Adams (Colo.)	To transfer the Air Corps Technical School from Chanute Field (Rantoul, Ill.) to Denver. Favorably reported by the Committee on Military Affairs. Subsequent to the committee report Senator Dieterich of Illinois introduced an amendment to keep the school where it is now and to make extended improvements at Chanute Field.
S.3426	McCarran (Nev.)	To supplant existing air commerce legislation and to broaden the powers of the Interstate Commerce Commission over air transport and extend them also to cover airport operation. Recommended for passage by the Senate Committee on Interstate Commerce.
	BILLS NEWLY INTRODUCED	
HR.9131	McSwain (S. C.)	A new proposal for a separate promotion list for the Air Corps.
S.2804	———	To give retired pay to General William Mitchell.

personnel numbered 24,195. Additions amount to more than 67 per cent

Observers point that Italy needs no such air arm to combat planeless Ethiopians wants full squadrons nevertheless to discourage European trouble while it gives its attention to Africa.

Two of Il Duce's sons have gone to Africa as pilot officers of a bombing squadron

First Giro Fatality

First airline passenger death since June of this year.

LAST MONTH one of the most striking aircraft safety records ever set up was brought to an end when Robert Swenson, piloting an autogiro, was killed in a take-off from Pitcairn Field, Willow Grove Pa. His passenger, John Miller, was severely injured. Previously no one had ever been killed in an autogiro in this country and but very few had ever been injured. Soon after the take-off, the engine cut out. The ship settled and lost speed. The engine came in again and the pilot tried to climb out over some wires at the edge of the field But the blades struck and were damaged, dropping the ship to the concrete road beneath

The first crash to result in an airline passenger fatality in the second half of 1935 occurred at Gilmer, Tex., Aug 15. A Delta trimotor bound from Dallas to Atlanta lost one of its three engines and plunged to earth burst into flames. Two passengers and pilot Andrew Dixon, and co-pilot Herbert Bulkeley were killed.

By Easy Stages

Solberg flies a Loening Commuter to Norway.

FLYING a Loening Commuter, deamphibianized by the removal of its wheels, Thor Solberg, pilot and Paul Oscanyan, radio expert, completed a flight to Norway Aug 16. They had left New York July 18. Following the Labrador, Greenland, Iceland, Faroe Islands route they waited for favorable weather on each hop, turned back once after taking off from Iceland

Series F-50 Approved

ATC's Issued for Geared Wright Cyclones

ISSUANCE of approved type certificates for the geared models of the Wright Series F-50 Cyclone engines has been announced by the Department of Commerce. The certificates were issued on July 17. They cover the Wright Cyclone SGR-1820 F52 and the Wright Cyclone SGR-1820-F53. Both of these engines are equipped with propeller speed reduction gears of 16 to 11 ratio

The Wright Cyclone SGR-1820-F52 has been rated at 760 hp at 2,100 r.p.m. at 5,800-feet altitude. Maximum manifold pressure except for take-off is 34½ inches Hg at rated speed. For take-off (one minute) 37½ inches Hg is permitted which provides for a power output of 805 hp

The Wright Cyclone SGR-1820 F53 has been approved for an altitude rating of 735 hp at 2,100 r.p.m. at 11,000 feet. Normal maximum manifold pressure is 34 inches Hg at rated r.p.m. but for take-off (one minute) 36½ inches Hg is permitted. This provides for a take-off power output of 735 hp

Except for the reduction gearing the geared Series F-50 Cyclones are identical with the direct drive models. All are equipped with the dynamic damper which eliminates torsional vibration controlled pressure lubrication of the valve gear, new cylinder heads and full pressure baffles

Work in Progress

New factories and enlargements. Sales. Bureau threatens comparative safety ratings

CONSOLIDATED AIRCRAFT busy last month with its moving to San Diego, announced it would dedicate its new plant on Sept 22, would invite a long list of aviation's notables to the ceremonies. Meanwhile 160 key men of its Buffalo forces were due to arrive on the West Coast about Sept. 1. Employment of the 1,400 other workers needed to fill its Army and Navy contracts has been started

North American Aviation, General Motors affiliate, which announced a West Coast move some months ago, has leased 20 acres at the southeast corner of the Los Angeles Municipal Airport Construction of its first units will start Sept 1, will make available some 150,000 sq.ft. of floor space, will cost more than $500,000

Still another factory has been started for aeronautical uses Allison Engineering Co., another General Motors affiliate, has awarded the Austin company a contract to build four buildings at Speedway, Indianapolis, Ind. Allison has long been in development of large liquid cooled aircraft engines. The new facilities forecast active production

Fairchild Aerial Camera Corporation has expanded its plant at Woodside Long Island, by one third to accommodate new volumes of production recently reached on Fairchild cameras and Fairchild Kreust radio compasses

Lockheed has begun production on five Whirlwind-powered Electras for Eastern Airlines, a repeat order of three Electras with Wasps for Pan American, and has almost finished four special Electras with custom designed interiors for private owners. Since it

LONG RANGE SOVIET

monoplane which started transpolar flight Aug. 9 from Moscow to San Francisco. Excessive oil consumption by its 850 hp engine forced it to turn back after several hours over the Arctic Ocean. Another attempt is scheduled for next spring

delivered the first Electra to Northwest a year ago 31 have gone into service.

Recent customers reported by Beechcraft include Mouton and Six, San Bruno, Calif.; R. M. Hardy, Yakima, Washington, Socony Vacuum Oil Co. of New York (their second Beechcraft), Republic Oil Refining Company of Houston, Texas, Reliable Flyers, Inc., Detroit, Mich., The Commercial Appeal, Memphis, Tenn.; J. M. Rush of Dallas, Texas, H. L. Farquhar (see page 72), Ward-Pearson, Inc., Minneola, Long Island, Duane Stranahan, Toledo, Ohio, and the Lion Oil Refinery Company, Eldorado, Ark.

Few features of last month's Show, save possibly the first releases on the Hammond and Waterman, have caused as much discussion throughout the industry as Director Vidal's announcement that the Bureau was planning different classes of airplane licenses based on comparative safety considerations.

"The present method of putting the department's approval on aircraft through a single class commercial license will be inadequate and dangerously misleading with the development of safer and more easily operated types, assuming, of course, as I think we can, that there will be a continued demand for conventional present-day airplanes of high speed and long range.

"We are thinking now in terms of three classes of airplane licenses, one for the safe, easily operated ship which the Bureau of Air Commerce is striving to develop to popularize private flying; one for present-day airplanes of the private owner type, and a third for fast-landing, high-speed craft of the modern transport type. The public has a right to know that there is a vast difference between the flying characteristics of such ships, and we mean to label them so it at least won't have to go into aviation blindfolded."

What's Around That Corner?

WITH Congress adjourned, interest turns back to the executive departments and the use that they are to make of their aerial authority. Procurement schedules have been moving somewhat more slowly than was anticipated, especially in the Navy. The Army ought to let new airplane and engine contracts for $5,000,000 and more during September and October, another $3,000,000 before the end of the year. Of the Navy's procurement appropriation at least 70 per cent is likely to be held back until after Jan. 1 before definite allotment.

Very few new airport development projects have so far been approved under the Works Progress Administration (spending the famous $4,-800,000,000), almost as few are likely for the future, the $58,000,-000 optimistically bid for by the Bureau of Air Commerce three months ago seems gone to limbo.

From the passage of the Wilcox bill for Army air bases expect no immediate developments except the starting of a very deliberate investigation by the War Department and a swarming rush of Chamber of Commerce lobbyists into Washington. At least nine months and possibly much more is likely to pass before the formal declaration of any new major station.

The McCarran bill to recast air commerce law staged a surprise in the closing days of the session by securing a favorable report of the Interstate Commerce Committee but can be counted on to get no further unless the President should surprisingly come out in favor of it. No major recasting of the law of commercial aviation or of general transport regulation is likely during the next session of Congress, though I.C.C. reorganization is an outside possibility.

The Senate Committee on Civil Aviation is apparently dead of neglect. Senator McKellar has commercial aviation policy very much in his own hands, has no intention that it shall go elsewhere.

Air line traffic for the coming fall may be expected to show even more relative gain over a year ago than the summer has recorded. Domestic passenger-miles should continue as high as 20,000,000 per month throughout the winter.

Indications are favorable for revived transport equipment buying in the immediate future. The purchasing season for private planes which started slowly (as foretold in these columns last May) should continue at high volume later in the year than usual. Production now running about 100 per month should remain above 80 in October.

The passage of neutrality legislation prohibiting arms exports to belligerents will have less effect on the volume of American aircraft manufacture than is commonly supposed, may in fact have no perceptible effect at all. The legislation awaits official interpretation but may be expected to apply only to aircraft specifically military in type or consigned directly to a belligerent government. The State Department may be expected henceforth to give full recognition to the non-military status of aircraft of commercial type despite frequent proposals that all airplanes be treated as potentially and therefore intrinsically military instruments.—E.P.W.

Financial

Boeing and Curtiss-Wright report six months results. Wright, Lockheed, United Aircraft, the United Airlines score profits. British aircraft stock movements.

• BOEING AIRPLANE COMPANY (includes Boeing Aircraft, Boeing Aircraft of Canada, Stearman) report for the half year ending June 30:

Sales and other income	$466,112
Reserves for experimental planes	255,737
Costs of sales and operations	703,935
Net after Dep'r & Taxes	437,021
Per Share	—0.84

• WRIGHT AERONAUTICAL CORPORATION report for half year ending June 30:

	1935	1934
Net after charges and taxes	(—)$40,668	$401,293

• CURTISS-WRIGHT CORPORATION report for half year ending June 30:

	1935	1934
Net profit after charges and taxes	$260,228	$94,507
Per class A share	—0.33	0.00

▲ LOCKHEED AIRCRAFT CORPORATION report for the six months ending June 30:

Net profit after Dep'r but before taxes	$153,934
Per share	0.39

• UNITED AIRCRAFT CORPORATION report for the three months ending June 30:

Sales	$2,764,581
Operating Loss	35,898
Other Income	262,369
Net after Dep'r., Taxes and Charges	177,914
Per share	0.06

• UNITED AIRLINES report for first two 1935 quarters:

	1st Quarter	2d Quarter
Net after Dep'r before Fed. Tax	(—)$426,933	$107,326
Revenue Account		
Passengers	$762,672	$1,413,860
Mail	683,793	742,634
Express	50,131	70,215
Total	$1,664,828	$2,340,233

▲ IN THE LIGHT of Britain's extensive expansion program (see page 54) the movement of British aircraft stocks during past months is interesting. Evidently, there as here, stock prices respond to individual circumstances rather than general programs.

	End of Oct '34	End of April '35	End of Aug. '35
DeHavilland	56s.	63s. 9d.	57s. 6d.
Handley-Page	12s.	17s.	22s. 7½d.
Hawker	24s.	27s. 4½d.	27s.
Vickers	10s. 1½d.	10s. 10½d.	16s. 4½d.

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Schools, Services, and Airports

● ALABAMA—James Keeton, refueling plane pilot for the Key brothers' long flight, is cooperator of the Keeton-Parker flying service, Bates Field, MOBILE. Aug. 4 airminded Mobilians saw the Keys in "Ole Miss," with Keeton and W. H. Ward in the refueling plane, demonstrate how fuelling contacts are made. . . . Runway sodding, a concrete marker, new wind indicators are among improvements now nearing completion at Legion Field, SELMA. . . . BIRMINGHAM now a stop on American Airlines' Charleston-Fort Worth route, hopes shortly to have a Chicago-Nashville connection. Advisors to the City Commission on the project: Homer Panter, Leary Redus, Hayden Brooks, Steadham Acker.

● ARIZONA—The city of PHOENIX has solved its difficulties over Sky Harbor by buying it from the Acme Investment Company for $100,000. In all it comprises 280 acres, has a large hangar, shops administration building and radio and lighting facilities. Fred Wilson, city manager, has announced that new contracts will be made with the present users of the field. Ramps, oiled runways, building enlargements, landscaping are proposed improvements.

CONGRESSIONAL STOP LIGHT
at Washington's airport. And nothing can be done about it because the road across the field is a "military" highway. Legislation to remove it failed at the last session.

● CALIFORNIA—The Kern County Airplane Charter Service, with Walter Reed as business manager and Jack Hardesty as pilot, has been organized in SAN JOAQUIN VALLEY. Special trips are being planned between Bakersfield and the San Diego exposition. . . . EUREKA'S Murray Field was the scene late in July, of a flying circus and air show. A treasure hunt was a program feature. . . . A portion of the roof and the south wing of the Grand Central Air Terminal at GLENDALE was destroyed by fire with an estimated damage of $20,000. Repairs are already under way. . . . The Navy has leased 250 acres of land and 100 acres of water at Allen Airport Terminal Island, LONG BEACH. A quarter of a million dollars will be spent on construction and improvements. . . . Long Beach, with federal aid, also plans extensive improvements in its municipal airport. . . . The LOS ANGELES Chamber of Commerce announces that North American Aviation, Inc., has leased 20 acres in the southeast corner of Mines field and will build a $500,000 airplane factory there. Construction will start about Sept. 1. . . . Mines Field has also been selected as one of the 21 airports in the country to be equipped for blind landings by the Bureau of Air Commerce. . . . John Nagel, manager of Los Angeles' Eastside Airport, has been granted an exclusive permit for passenger flying from that field. . . . Tax assessments on the SACRAMENTO Airport have been reduced from $150 to $10 per acre. . . . SAN DIEGO is to have one of the two Pacific Coast Guard Air Bases. . . . A hangar is to be erected immediately at OXNARD'S new airport. Total cost $10,000, of which the Federal Government will furnish $8,000. . . . SANTA ROSA is seeking $50,000 of relief funds to improve the municipal airport recently acquired by the Chamber of Commerce from the Richfield Oil Company.

● COLORADO—DENVER'S municipal airport is installing a modern public address system. . . . The Denver city council contemplates a bill to prohibit night sight-seeing hops between the hours of 9 or 10 p.m. and 5 a.m. . . . The War Department's recommendation that the Air Corps Technical school at Rantoul, Ill., be moved to Denver was approved Aug. 3 is now pending enabling legislation.

● CONNECTICUT—An injunction which sought to prevent the NORWALK Airport from holding flying circuses and other aviation exhibitions was denied. The complainant was suing on the grounds that her property adjoining the airport had suffered in value. The court held that none of the claims had been proved. . . . Following recommendations of State Aviation Commissioner Charles L. Morris, a committee has been appointed to study the advisability of having an airport at NORWICH. . . . WESTERLY has chosen a site for an airport. Plans will be completed soon. . . . The American Legion sponsored an air meet at Way airport, SAYBROOK, late in July. Charles Burd of Essex was chairman of the committee in charge. . . . Brainard Field, HART-

FORD, has scheduled a National Guard air meet, to be held Sept. 14 and 15, under the auspices of the State Tercentenary Commission

● DISTRICT OF COLUMBIA—Installation of the last unit of the blind flying landing system at WASHINGTON Airport has been completed. Meanwhile, in the capital, controversy over the McSwain bill authorizing the sale and closing of Military Road which now bisects the airport and menaces both air and ground traffic, ended in a deadlock with no action possible in 1935. Plans for a floating airdrome to be built on the Potomac, have been submitted to the House District Committee.

● FLORIDA—The FORT PIERCE Flying Club has purchased a Taylor Cub. Members will receive instruction from Clate Weaver who flew the plane in from Bradford, Pa. . . . R. B. Hockensmith is in charge of a group planning a flying club in TAMPA. Associated with him are C. C. Vega, Jr., Mat Beasley, and C. W. March. . . . Among Tampa's new PWA projects, recently approved, are improvements on the Peter O. Knight Airport on Davis Island (appropriation $150,345) and Drew Field (appropriation $46,690).

● GEORGIA—The Raymond and Miller Company has taken a long term lease on Miller Field, MACON, and will operate a sightseeing and charter service. Since Miller Field has been found inadequate for Eastern Airlines new Douglases, city officials are seeking funds either to improve that airport or to construct another of ample dimensions. Bureau of Air Commerce officials Paul Myers and Phoebe Omlie visited Macon recently to advise on the project.

● ILLINOIS—The Air Law Institute of Northwestern University, planning a study of legal questions connected with municipal airports, has invited all operators to submit such problems with which they have had experience. . . . The PEORIA Aeronca Club, composed of 22 members, has acquired a new plane. . . . MOLINE has applied for a half million dollars to improve its newly purchased municipal airport. . . . Instructors at DANVILLE'S airport are busier this season than ever before. Eight planes are now quartered there. . . . A movement has been started to name CHICAGO'S proposed lakeside airport Will Rogers Field in memory of the famous humorist.

● INDIANA—A brief tornado, ripping through EVANSVILLE'S municipal airport in mid-July, slightly damaged three airplanes. . . . BLOOMINGTON airport has a flying school with an enrollment of more than twelve students. Instruction is given by Everett Winings and Ernest Baldwin. . . . The MUNCIE Aviation Corporation has taken over the distributorship of Aeroncas for Indiana and part of Illinois in addition to handling Waco planes. . . . Preparations for the Midwest Aviation Exposition at Bendix municipal airport, held on Aug. 3 and 4, included the erection of bleachers accommodating 10,000, improvement of roads to the airport, smoothing out of runways, and installation of two-way short wave radio for directing flight maneuvers. More than 140 visiting planes attended. . . . Indiana is in the first rank of states completing airports with CWA and FERA funds. Twenty-four airports have been constructed with federal labor and ten others improved. New airports are at Angola, Bloomington, Brown County, Connersville, Shelbyville, French Lick, Sullivan, Rensselaer, Culver, Fowler, Marengo, North Vernon, Plymouth, Seymour, Valparaiso, Washington, Rochester, Wimamac, Michigan City, Wawasee, Portland, Farmland, Columbus and Lafayette.

● IOWA—The DES MOINES city council recently granted permission for the establishment of a school for radio operators at the city airport. The school will be run by F. C. Anderson and Leo Brennan. . . . Five airplanes were damaged and a $1,000 hangar demolished when a small tornado centered on GLEN ACRES private flying field late in July. Total damage was estimated at $4,000.

● KANSAS—The WICHITA Aviation Club is planning to hold an air show Oct. 6, at the conclusion of the 1935 Kansas air tour. More than 30 planes are already registered for the latter event. . . . With the signing of a contract between the Wichita park board and the Army, the airport will become a regular stop for army planes on cross-country flights. Director of parks and airports Alfred MacDonald announces sales of gasoline and oil during July were the biggest in the history of the airport. Contrary to usual practice, the park board handles the servicing of planes with city employees, the profits returning to the park board funds. . . . The Women's Aeronautical Association of Kansas recently held a benefit dance at the Wichita airport. Attendance was estimated at over 1,600.

● KENTUCKY—An airshow, attended by a crowd of 1,500, at Glengarry field, LEXINGTON'S new municipal airport, took place July 21 and 22. The show was sponsored by the American Legion gathered in Lexington for their annual state convention. . . . Lexington city officials have applied for government funds with which to construct a permanent stone hangar. . . . RICHMOND is seeking an allotment to construct a municipal airport. A tentative site 5 miles from the city has already been chosen.

● LOUISIANA—Krumbhaar Herndon, NEW ORLEANS, had a close call in July when his plane was struck by lightning above the Shusan airport. Herndon was uninjured and his plane only slightly damaged. . . . Announcement has been made by Walter Snider, general chairman of the "Delgado Mard" drive of the sources of the funds that sent that ship to the National Air Races. A $5,000 motor was donated by the Curtiss Company and a propeller valued at $2,000 was secured as a loan. A large number of the school's students accompanied it to Cleveland. But last minute engine trouble prevented its take-off in the Thompson Race. . . . LAFAYETTE city trustees named Leo J. Gros as temporary manager of the municipal airport. He will take the place of Glynn M. Jones who has been called to Anniston, Ala., for six months' training in the Air Corps.

● MAINE—CALAIS is considering the construction of a municipal airport as a relief project, acquiring the property through deed and lease as Portland did in the case of the municipal airport at Stroudwater. . . . The Gannett Publishing Company has purchased a new Stinson Reliant four-place cabin plane. When the ship is not in use for the several newspapers of the publishing company, it will be used by the PORTLAND Flying Service, Inc., which has leased it for air taxi and photography work. . . . HOULTON city officials are trying to get their almost completed airport approved by the government as a Port of Entry to this country for land planes. It is located a scant half mile this side of the Canadian border. . . . About 58 of the 120 men employed on the construction of the BIDDLEFORD airport have been removed until more federal funds become available.

● MASSACHUSETTS—William Reed and Edward J. Borrelli of LAWRENCE are the sponsors of a new organization, the Oakland Aviation Club. They offer a two-year training program and are seeking members between the ages of 18 and 25. . . . The federal weather station has been moved to the SPRINGFIELD airport, from the Bowles-Agawam airport, and Albert L. Brill has been appointed observer. . . . Ground has been broken for the new racetrack to be located on the site of the Bowles airport. A minimum of field and hangar space is to be retained for aviation purposes. . . . Since Springfield is seeking federal approval for its municipal airport for transport purposes it has already started to increase the length of runways and is planning other changes. . . . Dr. Alexander Forbes of Harvard Medical School, and Charles Hubbard, former Harvard football captain, took off in a Fairchild cabin plane from the BOSTON airport late in July

on a three-week aerial mapping flight over Labrador.

● MICHIGAN—FRANKFORT and NORTHPORT have both dedicated new airports. Northport's field is a memorial to the late Captain Clinton F. Woolsey. . . . The American Legion sponsored an air show late in July at the ANN ARBOR Municipal airport. . . . A club of all pilots over 50 years of age was formed at DETROIT during the aircraft show. Gar Wood, Wilham B. Stout are among the fifteen charter members. . . . An air circus, featuring bombing, sky-writing, and an appearance of Clem Sohn was put on at the Bishop Airport, FLINT, under the auspices of the 40 and 8, veterans organization, late in July.

● MINNESOTA—The Naval Reserve aviation base at Wold-Chamberlain Field, MINNEAPOLIS, has been allotted $25,000 to make repairs and improve buildings. . . . Fifty-one acres of usable runway have been added to Minneapolis' municipal airport as a result of filling, grading and surfacing work done under the ERA and CWA work relief projects . . . . The SLAYTON airport made a return of $1,700 to the village this year from a crop of grain grown on the 160 acre tract. . . . The new GRAND RAPIDS air field was dedicated Aug. 3 in a ceremony under the auspices of the American Legion. . . . Application has been made for $190,094 in Works funds to continue the northern transcontinental airway from ST. PAUL to the northwest. . . . The DULUTH American Legion sponsored an air show at the Municipal airport late in July.

● MISSISSIPPI—Many Mississippi towns and cities are planning celebrations in honor of the Key brothers. They appeared in vaudeville at LAUREL last month. . . . Bill Kessler and Erwin Saltzberger of Columbus, Ohio, have been making night flights over CLARKSDALE in a 12 passenger tri-motor Ford. They also took part in the air circus there in mid-July. . . . One of the projects recently submitted to the WPA for approval by the city of JACKSON involves extensive grading and repairs to the municipal airport.

● MISSOURI—Alvin H. Walker of KANSAS CITY has bought a Wasp motored Fairchild cabin plane from the Byrd Antarctic expedition and has announced plans for a round-the-world barnstorming trip. . . . The Naval and Marine Air Corps have established a new base at Kansas City at the Fairfax airport. Equipment will exceed a quarter of a million dollars in value. . . . The Airport Association of the LAMBERT-ST. LOUIS Municipal Airport has elected two new officers: president Ben Lichty, member of the St. Louis Flying Service, vice-president, J. T. Verlin, president of Verlin, Inc. . . . Sixteen foreign students are enrolled in the Parks Air College, EAST ST. LOUIS. . . . SPRINGFIELD has applied for a $50,000 loan to resurface runways on its municipal airport. American Airlines recently discontinued service there.

● MONTANA—Anticipating that Northern Transcontinental airplanes will be routed by way of HELENA on their flight from Chicago to Puget Sound, the Helena Airport Commission has broken ground for an administration building at the Municipal airport.

● NEBRASKA—Civic Enterprises, Inc., a subsidiary of the OMAHA Chamber of Commerce, created to promote the annual Omaha Air Races, has elected Carroll D. Gietzen as its president.

● NEW HAMPSHIRE—NASHUA'S municipal airport now nearing completion will be formally dedicated during the State American Legion convention to be held there during the first week in September. . . . LACONIA saw its first air circus early in August. It was sponsored by the Belknap Aviation Club. . . . Seaplanes, Inc., operating at LAKE WINNIPESAUKEE with its headquarters at the Weirs has added a Travelair seaplane and an Aeronca seaplane to its equipment. Operators of the company are Joseph and Walter Epply.

● NEW JERSEY—The ELIZABETH Flying Club has filed articles of incorporation with the county clerk. The club has fifteen members and has bought a plane which is stored at the WESTFIELD airport. Kenneth Woundy is president. . . . TUCKERTON has abandoned proposed plans for construction of an airport with federal funds. . . . Operating privileges at Mercer Airport, TRENTON, have been granted to Frederick Probst and William Hinton of NEWARK.

Calendar

Sept. 2—Airmeet at Clover Field, Santa Monica, Cal.

Sept. 7-8—Annual Airmeet at Buffalo, N. Y.

Sept. 14-15—National Guard Airmeet Brainard Field, Hartford, Conn.

Sept. 22-23—Fifth Annual Meeting of the National Association of State Aviation Officials, Hotel Statler, Detroit, Mich.

Oct. 2—Start of Kansas Air Tour, Wichita, Kan.

Oct. 4-5—Regional Airport Conference, Birmingham, Ala.

Oct. 6—Air show, Municipal airport, Wichita, Kan.

● NEW YORK—YONKERS' newly formed aviation club headed by Paul Lonquich, hopes to obtain permission to use city land on the river front as an airport for both land and seaplanes. The club plans to buy an Aeronca, and a Great Lakes trainer equipped with pontoons. . . . The ENDICOTT Aero Units flying school at the Tri-City airport, now has about twenty members. . . . The WEST UTICA Aviators' Club observed its silver anniversary late in July. . . . Among the cities receiving WPA grants for airports are: ROCHESTER, $860,000; ELMIRA, $232,000; WATERTOWN, $494,000; SARATOGA SPRINGS, $265,000. . . . THE BUFFALO Aero Club gave a farewell party to members of the Consolidated Aircraft Company, who are leaving Buffalo for San Diego. Major Doolittle was among the guests of honor. . . . Runways on the Amboy airport, SYRACUSE, are being paved. . . . CANTON has selected a site for its new airport.

● NORTH CAROLINA—The local flying service at the WINSTON-SALEM Airport has purchased a Taylor Cub. . . . A teletypewriter service has been installed at the same airport by the Dept. of Commerce. . . . CHARLOTTE'S Junior Chamber of Commerce sponsored an air show late last month.

● OHIO—The TOLEDO Aviation Club has moved into new headquarters at the Waldorf Hotel. . . . Eighteen new students are enrolled in the flying school at the SPRINGFIELD airport. The Seidners, father and son, who operate a flying school in YOUNGSTOWN have acquired a second ship, a Taylor Cub. . . . The city of AKRON is negotiating to secure the hangar at its municipal airport formerly occupied by Air Services, Inc. . . . James Borton, manager of the General Airmotive Corp. of CLEVELAND has announced that that company has acquired dealerships for Menasco Engines and B. G. Spark plugs. They already offer official servicing of Wright, Stromberg, and Scintilla products.

● OKLAHOMA—The airport at WAYNOKA is to have a federal weather station and air-line radio. Work on these projects will begin about Oct. 1. . . . The Will Rogers Airport at CLAREMORE has applied for Federal funds with which to make necessary improvements. . . . Independent operators put on an air show at Wiley Post airport, Oklahoma City, late in July.

● OREGON—Tex Rankin, chairman of Aeronautics Board, was on an extended trip through the East, last month, demonstrating the new Ryan S-T. . . . Regional meeting of the Aeronautical Chamber of Commerce, with Fowler Barker attending from Washington, D. C., was held in PORTLAND, Aug. 6. . . . Gordon Mounce, former PORTLAND

flyer, was given a "highest decoration" for student instruction, classed as service to the country, by King Carol of Roumania . . . Capt Ken K Kleaver, of the Kleaver Flying Service is making a success of his barnstorming Kleaver uses a Wasp-powered Fokker F-10-A, carrying passengers on scenic flights for a dollar a head

● PENNSYLVANIA — Governor Earle has purchased an autogiro from the Harrisburg Autogiro Company He plans to commute between his home at Haverford and the State capital. . . . The Bayn Mawr Flying Club with headquarters at the Main Line airport, has bought a two-passenger Eaglet to be used in flight instruction . . . The Lancaster airport was dedicated in a two-day celebration, Aug 17 and 18. It was sponsored by the Lancaster Aero Club whose president is Jesse Jones . . H C Pottorff, manager of the Waynesboro Municipal airport, is organizing a flying club . . . Coatesville business men have decided to issue stock to refinance Coatesville's airport, and finish the work on the field . . . The David Peterson Aero Club sponsored its second air show at the Honesdale airport, late in July . . . The Elk Run Volunteer Fire Company were the sponsors of the Punxsutawney Air Derby held at Brae-Breeze airport Aug 3 and 4 . . . Chambersburg's new airport was dedicated late in July Fred Soule has opened a flying school at the Wilkes-Barre-Wyoming Valley airport.

● Rhode Island—Work is progressing on the state airport at Hillsgrove. No official date for completion of field has yet been given out, but about 75 city officials, engineers, contractors and PWA inspectors employed on the project held a "completion and pre-dedication" outing the first week in August

● SOUTH CAROLINA—Lt Howard S Behr, recently appointed manager of the new Anderson Airport put on an air show, late in July, at Greenwood's city municipal airport.

● SOUTH DAKOTA—The Cheyenne Agency Airport at Whitlock Crossing was dedicated with an air show early in August Ralph P McKinnon, state airport advisor, was in charge

● TENNESSEE — Murfreesboro's first flying school is now ready for operation, and will give flight instruction Sundays and weekday afternoons. Its owners and operators are Dick Bomar and Franklin Knapp Nashville has been authorized by the state legislature to issue $100 000 of airport bonds to buy an airport site Construction with PWA funds will start shortly.

● TEXAS—A $15 000 dormitory accommodating 100 persons will be built for the student fliers enrolled in the Dallas Aviation School at Love Field, and will be ready for occupancy about Oct. 1 . . . Also to be built at Love Field is a $40,000 hangar for the E. F. Booth, Inc, Airplane Sales & Service Co . . . Dallas' city council has selected seven members to serve on a new aviation committee. . . . Houston's Chamber of Commerce aviation committee has recommended that the city purchase and improve the Houston airport.

● UTAH—Salt Lake City is planning to surface its municipal airport to reduce the dust hazard . . . Seventy-six army planes took part in the Covered Wagon Days celebration at that city late in July Vern G Halliday, manager of Salt Lake Airport, attended the San Francisco and Los Angeles regional airport meetings of the Aeronautical Chamber as a special representative of the Governor of Utah.

● VERMONT — Swanton airport, which has been enlarged and improved with government funds during the last year, has been designated as a temporary port of entry into the U. S. . . . Plans for the improvement of Burlington's airport have been completed, and application has been made to the WPA for assistance

● VIRGINIA—New airports to be constructed with federal funds include Petersburg's municipal airport, located on Johnson Road, and the Newport News Municipal Airport which is scheduled to open officially Oct 5, during the state air tour planned for the first week in October Irvington is making plans for a small airport to be constructed on the old airport grounds Business men of Kingston, Bristol, and Johnson City, Tenn., submitted to the WPA plans for a modern $500 000 airport at Holston Institute.

● WASHINGTON—Seattle plans an air show and races to be held Sept. 6-8 at Boeing Field. . . . The American Legion held its second annual air show at Aberdeen last month. Twenty planes took part

● WEST VIRGINIA—FERA work on Beckley's airport, Scott Field, is nearly completed. . . . Bluefield is contemplating making extensive improvements on its airport.

● WISCONSIN—Howard Morey of Madison has been elected president of the newly formed Wisconsin Aeronautical Association . . . One of the features of Milwaukee's centennial celebration, held last month was an air show and a pageant of aviation progress, depicting developments from early flying days down to the most modern transport planes used on present day airlines.

ALASKAN CARGO

Is rugged. A shipment of mining machinery parts for a new gold field, flown in from Juneau by the Great Air Transport. Left to right: Frank Knight, pilot; Eric Schulte (archaeologist); Vern Gorst, flying director

Aviation People

• The crash near Point Barrow, Alaska, last month cost American Aviation an unrivalled champion and a priceless friend

Few pilots could match the single-purposed devotion with which WILEY POST pursued his profession None ever reached such heights against so many handicaps Fifteen years ago an accident in the oil fields of Oklahoma cost him the sight of an eye. Post used the accident compensation money for flying lessons and the purchase of a war surplus plane with which he started barnstorming throughout the Southwest

Not until 1930 did he reach national prominence That year he won the California-Chicago race to the National Air Races in the Winnie Mae. The following year he made his flight around the world with Harold Gatty in 8 days and 16 hours. In 1933, flying alone, he beat that by a day More than most, his record flights have pioneered new technical development. The first round-the-world flight proved the Gatty drift indicator of definite merit. His second had much to do with the rapid adoption of the robot-pilot, and the radio homing devices. His dogged attacks on the transcontinental record via the stratosphere have been real pioneering of the most splendid sort.

WILL ROGERS became an airline addict earlier and more authentically than any American of his generation. He crouched in the mail compartment of mail planes before there were any passenger accommodations He has used and boosted every new development in passenger service since Although he once had a couple of ribs broken in a minor crack-up, he never lost his enthusiasm. He knew countless pilots And they treasured him as a friend No outstanding record flight missed his comment and praise No airline accident occurred that he did not hasten to mitigate by sound analyses in his daily column

There is no prospect that these two can ever be replaced.

Wiley Post

Dr. Jerome C Hunsaker

Anthony H. G. Fokker

Walter A. Hamilton

• The United Aircraft Corporation announces the appointment of DR. JEROME C. HUNSAKER, head of the department of aeronautical and mechanical engineering at the Massachusetts Institute of Technology as its technical advisor. In charge of aircraft development for the Navy during the world war, later director of aeronautical developments for Bell Telephone, Dr. Hunsaker served as vice-president of the Goodyear Zeppelin Corporation prior to his installation at M.I.T. He was a member of the Federal Aviation Commission

• ANTHONY H. G. FOKKER, whose company in Holland holds the European agency and manufacturing rights for Douglas DC-2 transports is on a visit to this country. He reported sales in Holland, Switzerland and Szechoslovakia

• WALTER A. HAMILTON, superintendent of maintenance for Transcontinental and Western Air, Inc., sailed Aug. 7 for Holland where he will study the Dutch air transport system. He will be gone approximately six weeks

• The Bureau of Air Commerce has appointed HOWARD C. STARK as an airline inspector. Instrument-flying-examiner-at-large would be a more accurate title for his proposed duties. Stark's 1-2-3 system of instrument coordination needs no introduction to airline pilots Stark himself has been flying for thirteen years, and has served with the old Colonial Airline between New York and Boston, with Pan-American, Eastern, and the KLM. He is the author of a book "Instrument Flying"

• RENSSELAER CLARK, former lieutenant commander in the Navy, and recently factory manager for the Bliss Engine Company, New York, has been appointed assistant general manager of United's Sikorsky division

• The newly formed Bell Aircraft Corporation, which will occupy the Buffalo plant of Consolidated Aircraft when that company completes its move to San Diego, has elected officers and directors. President, LAWRENCE D. BELL, former Consolidated vice-president and general manager, vice-president and treasurer, RAY P. WHITMAN, former Consolidated vice-president and director, secretary and assistant treasurer, CHARLES L. BEARD, former assistant to the treasurer of Consolidated These three are also directors. Other directors are ROBERT J. WOODS, former Consolidated engineer, and WALTER C. LINDSAY and WILLIAM J. O'CONNOR, attorneys.

• AMELIA EARHART has resigned from her dollar a year position with the Bureau of Air Commerce to devote herself to commercial aeronautical activities

• ELWOOD H. HEARIG has joined the Fairchild Aircraft Corporation, of Hagerstown, Maryland, as Factory Manager Chief draftsman with the Dayton Wright Company at the beginning of the War, he served with that company until 1923, when he was made general manager of the Chance Vought Corporation Later he became vice-president

• WILLIAM E. BERCHTOLD has been made publicity director of the Plymouth

Division of Chrysler Motors, and manager of the Detroit Press Bureau of J. Stirling Getchell, Inc. He was formerly manager of the air transport section of the Aeronautical Chamber of Commerce.

• James R. Fitzpatrick, for twelve years vice-president in charge of sales of the Haskelite Manufacturing Corporation has resigned to become director of sales of the Algoma Plywood and Veneer Company, Chicago. He recently served as a member of the Board of Governors of the Aeronautical Chamber of Commerce.

• To Kellett Autogiro as design engineer comes Walter R. Jones after twelve years with Boeing. Best known of his designs are the Boeing F3B and the Model 95, a mail plane, for which he served as project engineer. At Kellett he will be assistant to R. H. Prewitt, Chief Engineer.

• For more than 6800 hours O. W. Coyle has piloted airliners for TWA. Last month pilots of TWA's Western division voted him as their choice for divisional chief pilot. Paul E. Richter, Jr., vice-president and Harlan Hull, chief pilot for the entire system, immediately confirmed the appointment.

• From Wichita to London by way of New York and Siberia is the ambitious trip being planned by Captain Harold Farquhar, First Secretary of the British Legation in Mexico City. He will use a new Beechcraft to which floats have been fitted in New York (see page 32).

• Capt. S. D. Scott, chief test pilot for Saunders-Roe, British aircraft manufacturers, has been in the United States some weeks on a tour of inspection. Recently he visited the Sikorsky plant and accompanied Capt. Boris Sergievsky in a test flight of the S43.

• Frank H. Hitchcock, the first public official in America to realize the transport potentialities of airplanes, died last month in Tucson, Arizona. Postmaster General in the Taft cabinet, he instigated the earliest demonstrations of air mail carriage, handing the first pouch to Earl Ovington at Sheepshead Bay, Long Island, for delivery at nearby Jamaica. Only Congress' reluctance to grant funds for such unheard of purposes balked him from making extensive tests six years before they were finally undertaken. His early interest continued to grow. To within a few weeks of his death he was a constant user of the air lines, an active participant in the affairs of the National Aeronautic Association as delegate-at-large and as one of the most faithful members of the Contest Committee, and had recenly been qualifying as a pilot.

Side Slips

By Robert R. Osborn

THAT great benefactor of aviation, Mr. James Farley, seems to have been the primary incentive for lots of fun for the bankers in re-shuffling and re-dealing aviation companies. You will remember that a short time ago TWA, Inc., changed its name to TWA, Inc. in about six steps using all possible permutations and combinations.

Now we read that sometime around the first of July the units of United Aircraft Company which were sent out from

the old homestead to go their separate ways a short time ago, had been combined into a single United Aircraft Manufacturing Corporation. Under the new arrangement the former presidents and vice-presidents of the separate units become engineering managers, factory managers, etc.

Of course it is only our own guess, but we suspect that the real reason for all of this corporate shifting around is that it makes it harder for Mr. Farley to aim at a moving target. Another real advantage is that it will be so delightfully confusing for the congressmen and senators who love to sit on the perennial investigating committees. Having listened to one committee member asking questions for about a half hour regarding the "Corsair," when it was evident that he didn't know whether it was the name of an airplane propeller or Mr. Morgan's yacht, we are looking forward with much anticipation to the next session's committees.

Yes, the Democrats have certainly been responsible for a lot of bewildering changes in the old familiar corporations, but if the next administration should be Republican we wouldn't be a bit surprised if TWA, Inc., changed back to its old name of TWA, Inc.

As a communication has just arrived from him, we have recalled the searching party sent out to determine the fate of C. F. McR., who used to cover the west coast waterfront for us. We once could count on him for at least half a column each month and we've gotten darned tired of having to do our own work lately. We suspect that C. F. McR. must have been sleeping or hibernating for a long time, as he has to go all of the way back to the January issue of Aviation to take a crack at us. "The Editors," he writes, "certainly weren't leaving anything to the readers' imagination when they wrote the following 'Hoses and pumping machinery are in pits below deck. The platform is entirely unobstructed, for the handling of aircraft. From the foregoing it is seen that all of operating mechanism is below the deck of the float resulting, as it properly should in an unobstructed area.'"

C. F. McR. evidently does not appreciate some of the finer points of journalism. In the February issue the Editors started their present direct and to-the-point reporting, so the January issue was written in just the opposite manner so that the customers would appreciate the change that much more.

C. F. McR. also claims a new record for the west coast stating that one of their pilots recently flew upside down with an inverted Menasco engine, or in a disinverted position. His claim will be allowed to stand until some eastern pilot can do the same thing with a pusher propeller on a tractor airplane.

The newspapers make note of another remarkable scientific advance which must be credited to aeronautics. "Trees that grew from seeds scattered by airplanes are growing in mountain fastnesses where man has never trodden, according to Hawaiian foresters, says Science Service. At the time they were first scattered it was impossible to determine whether any of the seeds took root, since the area sown could not be

reached on foot. Today, however, foresters report that the trees are visible from a distance."

This reminds us of a farmer we know, who once planted oats on a section of his land, just to disprove the claims of his neighbors that it was much too steep to ever grow anything on. He certainly proved his side of the argument, as the oats grew into a fine stand, which, of course, couldn't be harvested.

Buyers' Log Book

AVIATION'S *Card Index of New Equipment*

This department is equipped to help readers locate manufacturers of any parts, accessories or materials

AIRPLANE ACCESSORIES — **Aerial Camera**

Skyview Camera Company,
Municipal Airport, Cleveland, O

NEW, inexpensive ($165) aerial camera for amateur and professional use includes f4.5 Wollensak lens with built-in aero filter Accurately timed shutter New type of finder that gives upright image an integral part of one-piece aluminum alloy case Uses any $3\frac{1}{4}$x$4\frac{1}{4}$ film pack Weight 3 lb 11 oz, length $7\frac{1}{2}$ in Skyview case, covered with Dupont fabrikoid, lined with heavy plush, supplied with each camera

AVIATION, *September, 1935*

AIRPLANE ACCESSORIES — **Catalogue**

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

BOOKLET No. 2039 summarizes Westinghouse equipment for the aviation industry, both for aircraft and for ground installations Covers radio equipment, automatic fuel shut-off valves, generators and dynamotors, instruments, etc. Covers lighting equipment, air conditioning, and refrigerating units for airports, also welding, lighting, heat treating, and general power equipment for airport shops

AVIATION, *September, 1935*

AIRPLANE ACCESSORIES — **Door Lock**

Dudley Lock Co.,
235 W. Randolph St., Chicago, Ill

A PICK PROOF lock available for many aviation uses including airplane mail and baggage pits, hangar doors lockers, etc. Claimed to be drill-proof, force-proof, and the key, copy-proof Comes with a four edge key operating four sets of pin tumblers Underwritten by Lloyd's, insurance rates should be lowered on burglary policies Duplicate keys furnished only to original owners by presenting registry tag to authorized Dudley dealer

AVIATION, *September, 1935*

AIRPLANE ACCESSORIES — **Storage Battery**

Gould Storage Battery Corporation,
Depew, N. Y.

BULLETIN No 962 describes Gould Armored Kathanode aircraft storage battery Put up in five sizes, four 12-volt, one 6-volt unit Weight range $17\frac{1}{2}$ to 70 lb Special feature a spun glass retaining mat with a porosity of 90 per cent to lock active material in basic structure Cases conform to standard dimensional specifications Batteries assembled in genuine hard rubber single unit containers

AVIATION, *September, 1935*

AIRPORT EQUIPMENT — **Radio Transmitter**

Western Electric Company,
195 Broadway, New York, N. Y.

MODEL 14B, 400 watt radio transmitter for airport use Transmits on any of ten crystal controlled frequencies, selected by telephone dial Output, 400 watts at 2 to 12 megacycles, 300 watts at 12 to 18.1 megacycles Complete modulation over entire frequency range Remote control Requires 4 kva, 200/240 volts b, 50-60 cycle, 3 phase current supply 14B radio transmitter and 9B rectifier unit, $23\frac{1}{2}$ in x 27 in x 81 in.

AVIATION, *September, 1935*

MATERIALS — **Synthetic Rubber**

Thiokol Corporation,
Yardville (Trenton), N. J.

ANNOUNCEMENT made of a new oil-proof rubber, Thiokol D Not only oil proof but highly resistant to Duco thinners, lacquers printing inks, and most ordinary solvents Tearing resistance equal to or better than natural rubber Temperature resistant, will take hot oil at 200 deg F Tensile strength up to 1,700 lb per sq in., elongation around 500 per cent. Very flexible at temperatures minus 45 deg F.

AVIATION, *September, 1935*

SHOP EQUIPMENT — **Hand Drill**

Independent Pneumatic Tool Co.,
600 W. Jackson Boulevard, Chicago, Ill.

SAID to be the smallest electric hand drill available, is the Model U14 Thor Can be used in cramped locations One hand operation Drilling capacity, $\frac{1}{4}$ in., $\frac{3}{16}$-in holes in wood or metal Pistol grip, thumb control. Fitted with Jacobs Chuck, 1 extra set of brushes Spindle offset 1 in Thor patented ventilating system provides effective cooling of motor Length overall $6\frac{1}{2}$ in., weight $2\frac{1}{4}$ lb

AVIATION, *September, 1935*

SHOP EQUIPMENT — **Sheet Metal Shears**

Niagara Machine & Tool Works,
637 Northland Ave., Buffalo, N. Y.

A NEW folder published by the Niagara Company covers not only a variety of small sheet metal working equipment, but announces a new gate shear for manufacturing and airport shops Designed for pedal operation, equipped with self-locking eccentric holddown 18 in gap Will handle up to 16 gage steel sheet. Newly designed back gage is positive in setting, and easily and quickly adjusted. Five sizes, 3 to 6 ft widths.

AVIATION, *September, 1935*

INDEX TO ADVERTISERS

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : **OPPORTUNITIES** : EQUIPMENT—USED or RESALE

UNDISPLAYED—RATE PER WORD

Positions Wanted (full or part-time salaried employment only) 5 cents a word, minimum $1.00 an insertion, payable in advance. (See ¶ on Box Numbers)

Positions Vacant and all other classifications including equipment, 10 cents a word, minimum charge, $2.00 an insertion.

Proposals 40 cents a line an insertion.

INFORMATION

Box Numbers in care of our New York, Chicago and San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch	$6.00
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An advertising inch is measured vertically on one column. 3 columns—30 inches—to a page.

COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL THE 15TH FOR ISSUE OF FOLLOWING MONTH Aviation

POSITION WANTED

ATTENDANT-COMPANION American age 30 requires situation. Licensed aircraft pilot, typist, drive any car, horseman, bodyguard, take legitimate risks. Location immaterial. Will travel anywhere. Permanency only. For fuller details contact Ralph D. Thissell, 20 Islington Road, Brookline, Massachusetts.

FOR SALE

85,000,000 MILES OF FLIGHT CERTIFY THE SOUNDNESS OF UNITED AIR LINES' CHOICE OF ECLIPSE EQUIPMENT

This month, United Air Lines will celebrate its eighty-five millionth mile of flight . . . and coincidentally, the completion of a million-dollar aircraft modernization program.

Since their initial take-off, in 1927, United Air Lines planes have been consistently Eclipse-equipped. Eclipse is justly proud of having had a modest part in the creation of this inspiring record—a typical example of what the American air transport industry is accomplishing.

United's Boeing transports employ Eclipse inertia starters, voltage-regulated generators and control boxes, vacuum pumps, suction regulating valves, retractable landing gear motors, battery booster coils and radio dynamotors.

ECLIPSE AVIATION CORPORATION
EAST ORANGE, NEW JERSEY
{Subsidiary of Bendix Aviation Corporation}

ECLIPSE